List of all Operational Improvements in the NAS Architecture 5 database

Show Operational Improvement Full Report

Service Group Air Traffic Services

Service ATC-Advisory

Capability NAS Status Advisory

Operational Improvement

Current NAS Status Advisory (103301)

Pilots require NAS status updates, which are essential to safety and efficiency. These updates and information that was not readily available during flight planning are either broadcast or provided directly to in-flight aircraft by specialists at the flight service station/automated flight service station, controllers at air traffic control facilities, and personnel at airline operations centers and other facilities. NAS status includes changes to the operational status of airspace, airports, navigational aids, in-flight or ground hazards, traffic management directives, and other information. Pilots receive some NAS status information, including runway status and weather information, via digital broadcast of automatic terminal information.

01-Mar-2004 to 30-Jun-2008

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

The current National Airspace System (NAS) Status Advisory updates pilots on NAS status that is essential to their aircraft's safety and efficiency. Updates on a NAS resource status that has changed or was not readily available during flight planning are either broadcast (via Very High Frequency Omnidirectional Range (VOR) -Voice) or voice transmitted directly to in-flight aircraft by controllers at air traffic control (ATC) facilities, specialists at flight service stations/automated flight service stations, and personnel at Airline Operations Centers (AOC) and other facilities. The NAS status information includes changes to the operational status of airspace, airports, navigation aids, in-flight or ground hazards, traffic management directives, and other data. The advisory includes digital broadcasting of automatic terminal information service, (D-ATIS), data, including runway status and weather information to pilots.

Air Route Traffic Control Center (ARTCC): Air traffic controllers in en route centers transmit a variety of information to pilots concerning NAS status. Controllers use communication and computer systems, such as the Voice Switching and Control System, (VSCS), and the Host Computer System, (HCS), to send pilots and AOCs alerts about hazardous weather, airport conditions, and air traffic control restrictions and traffic information, as well as any other pertinent data. Weather information includes severe turbulence and severe icing. Airport conditions encompass runway closures, weather information, and navigational aid outages. Air traffic control restrictions and traffic information include reroutes due to traffic, miles-in-trail restrictions, special use airspace, (SUA), status, Severe Weather Avoidance Plan (SWAP) programs, and Sector/Center constraints.

Air Traffic Control System Command Center (ATCSCC):The ATCSCC monitors and manages NAS to ensure a safe, orderly, and expeditious, air traffic flow while minimizing delays. The ATCSCC issues traffic management directives that directly affect pilots and airlines; they include alternative routes, ground-delay programs, SWAP, the national route program, and sequencing programs. The ATCSCC initiates and executes all directives in concert with the affected ATC facilities and user operations centers through the collaborative decision making (CDM) program. The ATCSCC specialist notifies affected users through teleconferences and other communication channels, such as the National Airspace Data Interchange Network, (NADIN), Aeronautical Radio Incorporated, (ARINC), and the Enhanced Traffic Management System (ETMS) system.

Airline Operations Center (AOC): The AOC is responsible for operating an airline's fleet of aircraft safely and efficiently. AOC dispatchers schedule aircraft and flight crews and develop and administer the policies and procedures for maintaining safety and meeting all Federal Aviation Administration operating requirements. Part of flight operations, dispatchers release (dispatch release) flights for takeoff after reviewing all factors that affect a flight. These include the weather, flight routes, fuel requirements, and the amount and distribution of weights onboard the aircraft. Through the CDM process, AOC dispatchers communicate with the ATCSCC personnel who update dispatchers with NAS status advisories. Dispatchers then update any affected pilots, recommending flight plan alternatives and, with the pilot, deciding on a course of action.

Air Traffic Control Tower: Tower controllers receive information on the status of NAS systems from various sources. They receive data on routes revised due to convective weather or ground-delay programs via the flight data input/output (FDIO) equipment and distribute the information to appropriate flights via the predeparture clearance function of the tower data link service. Controllers monitor some NAS equipment components directly in the tower, such as instrument landing systems, approach light systems, and very high frequency (VOR) navigational aids at the airport. These systems typically have both aural and visual alarms that alert controllers when systems fail. Controllers transmit equipment failure information to affected pilots over radio frequencies and to adjacent facilities via landlines and FDIO devices or through ETMS.

The airways facilities technician is another source of system outage information. The technician monitors the systems in the facility equipment rooms, and when the individual detects an outage, he/she informs air traffic personnel.

The notice to airmen (NOTAM) provides outage information for systems not located at the airport but which are still pertinent to operations, such as a departure fix VOR. The information is processed in the Host computer system or ETMS. Outage information may be placed on the D-ATIS or may be transmitted to affected flights via radio frequencies. As the status of critical equipment changes, this information may be broadcast from all positions simultaneously. In addition, information provided to affected flights includes equipment status, status of military operations areas, ground-delay programs, and SWAP routings obtained from the ARTCC.

Terminal Radar Approach Control (TRACON): TRACONs also monitor navigational aids and obtain and distribute status information using the same systems as air traffic control towers. In addition, TRACONs usually monitor and provide status on both primary and secondary radar systems. These systems may include airport surveillance radar, and mode select or air traffic control beacon interrogator secondary radar. Automated radar terminal systems IIE, IIIA, or IIIE and the Standard Terminal Automation Replacement System, (STARS), display radar target data. Outages of these critical systems may severely impact system capacity.

This information is shared with surrounding facilities and the ATCSCC using the voice switch system. Traffic-flow restrictions are usually implemented until systems are restored. Outages of navigational aids that affect departure routes are passed to towers and automated flight service stations so that flights may be issued alternative routes. Controllers in TRACONs also relay critical information to flights that they are controlling.

TRACON controllers use such status display systems as System Atlanta Information Display System, (SAIDS), equipment to distribute status information on a variety of items, including restricted area usage, current significant weather, runway visual range readings, significant pilot reports, and equipment problems.

Automated Flight Service Station, (AFSS), Flight Service Station, (FSS): Flight service station specialists obtain, process, and distribute status information through either the MODEL 1 computer system or OASIS and SAIDS equipment. This information includes NOTAM data as well as traffic management programs and military activities. Pilots can obtain status information by telephone or through face-to-face briefings. They may also contact the en route flight advisory service in-flight position via radio. Pilot Reports, PIREPS), also serve as a source of information of icing, turbulence, and wind aloft reports, as well as NAS system component outages.

Benefits

Current operations are provided in the NAS.

Systems

Aeronautical Telecommunication Network Air to Ground Router (key system)

The Aeronautical Telecommunications Network (ATN) Air to Ground Router (ATN A/G Router) provides air/ground data communication complying with International Civil Aviation Organization (ICAO) Annex 10 formats.

The ATN Program Office, AOS-900, entered into an agreement with the Japanese Civil Aviation Bureau (JCAB) on February 12, 1998. This agreement initiated trial and connectivity testing to implement ATN and the FAA owned ATS Message Handling System (AMHS) service to support the anticipated additional air traffic demands in the Asia/Pacific region. The FAA and JCAB successfully conducted connectivity and interoperability testing during 2001.

OKI Electric Industry Co. LTD (OKI) developed ATN router software for use by the JCAB air traffic control system. This unique and proprietary OKI software follows strict international aviation development guidelines and uses the Windows NT operating system. The FAA employed the OKI router software during successful compatibility and interoperability testing with JCAB in 2001 and it was found to meet all the desired technical and operational requirements. The FAA uses the OKI router software for the international data service component of ATN and if used in the U.S. will provide an economy of scale, operational efficiency, interoperability and commonality of equipment.

The FAA is required to obtain the software and support drivers in March 2003 to meet the integration and security processes needed for the initiation of the service with Japan. The agreement between the FAA and JCAB specifies the need to have the system deployed by August 2003 in order to initiate ATN service by March 2004.

Note: This router does not currently support NEXCOM, but could possibly be used as the ATN Backbone required in the future.

Automated Radar Terminal System - Model IIE (key system)

The Automated Radar Terminal System - Model IIE (ARTS IIE) provides radar data processing (RDP) and decision support tools to the controller in the terminal environment. Utilized at low to medium-size Terminal Radar Control (TRACONs) Facilities the ARTS IIE is capable of receiving input from up to 2 sensors, can process up to 256 tracks simultaneously, and support up to 22 displays. The ARTS IIE implements the Common ARTS software for improved performance maintenance efficiency. The radar data processing (RDP) software provides automated surveillance tracking and display processing. Included in the ARTS IIE software are decision support tools such as Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Mode C intruder alert, Converging Runway Display Aid (CRDA), and Controller Automation Spacing Aid (CASA).

Automated Radar Terminal System - Model IIIA (key system)

The Automated Radar Terminal System - Model IIIA (ARTS IIIA) provides radar data processing (RDP) and decision support tools to the controller in the terminal environment. Utilized at larger airports, ARTS IIIA is capable of receiving input from up to three sensors, can process up to 900 tracks simultaneously and support up to 36 displays. The RDP software provides automated surveillance tracking and display processing. Included in the ARTS IIIA software are decision support tools such as Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Mode C intruder alert, Converging Runway Display Aid (CRDA), Final Monitor Aid (FMA), and controller automation spacing aid.

Automated Radar Terminal System - Model IIIE (key system)

The Automated Radar Terminal System - Model IIIE (ARTS IIIE) consists of the hardware platform and software required providing radar data processing (RDP) and decision support tools to the controller in the terminal environment. The ARTS IIIE is used at consolidated Terminal Radar Approach Control (TRACON) facilities. The Common ARTS program provided an ARTS IIIE capable of receiving input from up to 15 sensors, the ability to process up to 10,000 tracks simultaneously, and support up to 223 displays. The RDP software provides automated surveillance tracking and display processing including mosaic display of radar data. Included in the ARTS IIIE software are decision support tools such as Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Mode C intruder alert, Converging Runway Display Aid (CRDA), Final Monitor Aid (FMA), and controller automation spacing aid.

Automated Surface Observing System Controller Equipment - Information Display System (key system)

The Automated Surface Observing System (ASOS) Controller Equipment (ACE) - Information Display System (ACE-IDS) is a hardware upgrade and software replacement to the ACE. The ACE-IDS is an integrated COTS/NDI system that allows data from multiple internal and external sources to be consolidated onscreen in many combinations and formats for easy access within a graphical user interface. Reference data, such as charts, maps, approach plates, procedures, etc., can be integrated with real-time data collected by interfaces to other systems.

Digital Voice Recorder System

Provides modern digital voice recording devices used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

In Feburary 2004, the DVRS was upgraded with a 24-channel card, which replaced the 16-channel card. This minor upgrade, called DVR II, was not extended to the systems installed prior to February 2004.

Digital Voice Recorder System Replacement

The Digital Voice Recorder System Replacement (DVRS Replacement) is a modern digital system used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

Display System Replacement (key system)

The Display System Replacement (DSR) provides continuous real-time, automated support to air traffic controllers for the display of surveillance, flight data and other critical control information. This information is processed by the Host and Oceanic Computer System Replacement (HOCSR) and the Enhanced Direct Access Radar Channel (EDARC) subsystems. The DSR provides controller workstations, displays, and input/output devices and a communications infrastructure to connect the DSR with external processing elements of the en route ATC automation system.

Enhanced Terminal Voice Switch (key system)

The Enhanced Terminal Voice Switches (ETVS) are installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) facilities with more than four air traffic controller positions. The ETVS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The ETVS (installed in the ATCT) provides the ATC operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the ETVS.

The ETVS (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within a TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the ETVS.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate ETVS systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Enhanced Traffic Management System (key system)

The Enhanced Traffic Management System (ETMS) application is at the heart of the Traffic Flow Management (TFM) system, and through it flows the network of all TFM interfaces. ETMS at the Command Center deals with the strategic flow of air traffic at the national level. ETMS at remote facilities is used for local airspace management within the local facility"s own area of responsibility. To facilitate coordination between the Traffic Management Coordinators (TMC) at remote Traffic Management Units (TMUs) and the Traffic Management Specialists (TMS) at the Air Traffic Control System Command Center (ARTSCC), each local ETMS may can also view the national composite picture of traffic for which the Command Center has responsibility. ETMS enables TMS and TMC personnel to track and predict traffic flows, analyze effects of ground delays or weather delays, evaluate alternative routing strategies, and plan traffic flow patterns.

The ETMS central hub is located at the Volpe National Transportation System Center. The hub collects flight schedules, and revisions, from NAS users, and collects actual traffic situation updates from local ETMS TMUs, and combines these with planned traffic initiatives (e.g., Ground Delay Programs) to generate an Aggregate Demand List (ADL) that is output to users every five (5) minutes. The ADL contains predicted arrival and departure traffic at individual airports. NAS users, e.g., air carriers, can access the ADL data to plan and revise their flight schedules to work more efficiently with planned traffic initiatives. This interactive process of flight planning gives users more input to TMCs on how traffic initiatives will affect them and is the heart of the Collaborative Decision Making (CDM) process.

Traffic Management Units (TMUs) are located throughout the NAS amd perform local flow control management functions. TMUs exist in all Air Route Traffic Control Centers (ARTCCs), 35 high activity Terminal Radar Approach Control (TRACONs), 8 Air Traffic Control Towers (ATCTs), 3 Center Radar Approach (CERAP) facilities, and the WJHTC. TMU hardware suites are automated workstations that include computer entry/readout devices, network communications, Flight Strip Printer (FSP), and a Traffic Situation Display (TSD).

NAS users are responsible for providing their own connectivity to the ETMS hub. The various connective user networks are collectively referred to as the CDM Network (CDMnet) which provides two-way connectivity to ETMS. Non-FAA users do not have access to all ETMS data and processing tools.

FAA Telecommunications Infrastructure

The FAA Telecommunications Infrastructure (FTI) services will replace most FAA-owned and leased telecommunications systems/services and consolidate their functions under a single service provider. The FTI contract will provide services that will meet current and future telecommunications requirements while reducing operational cost.

FTI is implemented in two phases. Phase 1 focuses on establishing an Internet Protocol (IP) backbone among 27 sites that includes ARTCCs, ATCSCC, Volpe, Aeronautical Center, WJHTC, and the two NADIN NNCC''s. Its primary goal is to transition 25 major nodes from the LINCS network. Phase 2 transitions circuits from DMN, BWM, NADIN PSN, and any remaining LINCS circuits.

FTI is a 15-year contract beginning in FY 2002 and ending in FY 2017.

Flight Data Input/Output (key system)

The Flight Data Input/Output (FDIO) system provides flight progress information for use by the Tower, Terminal Radar Approach Control (TRACON) and Air Route Traffic Control Center (ARTCC) controllers. The FDIO system allows Air Traffic Control (ATC) Specialists to input automated flight data, perform data manipulation, and print flight strips.

High Frequency Airborne Radios

High Frequency (HF) Airborne Radios are analog (HF multi-channel radio transceivers operating in the 2 - 30 Mhz frequency band installed in airborne commercial, cargo, and military aircraft transiting the oceanic, en route, terminal, or flight service station airspace domains. These transceivers are typically used in transoceanic applications.

High Frequency Ground Radios (key system)

High Frequency (HF) Ground Radios are analog HF radio devices operating in the 2 - 30 Mhz frequency band, which may be single channel transmitters and receivers or multi-channel transceivers. These radio devices are installed at oceanic and en route facilities and used to support tactical air traffic control (ATC) voice communications between a ground controller and a pilot in an aircraft in the oceanic domain. Additionally, these devices are also installed at regional facilities and used to support voice command and control communications /coordination in emergency or during disaster recovery situations occurring in the NAS.

Host Computer System (key system)

The Host Computer System (HCS) receives and processes surveillance reports, and flight plan information. The HCS sends search/beacon target, track and flight data, surveillance and alphanumeric weather information, time data, traffic management advisories and lists to the (Display System Replacement) DSR. The HCS associates surveillance-derived tracking information with flight-planning information. The DSR sends requests for flight data, flight data updates, and track control messages to the HCS. HCS-generated display orders are translated for use within the DSR workstation. While radar data processing is distributed among the terminal and En Route computer resources, the HCS performs virtually all of the flight data processing for its entire geographical area of responsibility. Every tower (ATCT) and terminal radar approach control (TRACON) relies exclusively on its parent HCS for flight data.

The HCS also runs algorithms that perform aircraft to aircraft (conflict alert) and aircraft to terrain (Minimum Safe Altitude Warning) separation assurance. The HCS algorithms provide visual and audible alerting to the controller when conflicts are identified.

The HCS presently supplies real time surveillance, flight data and other information to several decision support tools housed in collocated outboard processors connected via two-way high bandwidth links to the HCS and DSR. These are the (User Request Evaluation Tool, (URET), and the Traffic Management Advisory (TMA. URET performs probing of tentative flight plan changes to determine their viability. TMA provides sequencing and spacing information to align the aircraft in En Route airspace for approach.

Integrated Communications Switching System Type I (key system)

The Integrated Communications Switching System Type I (ICSS I) are installed at Airport Traffic Control Towers (ATCT), Terminal Radar Approach Control (TRACON) facilities, and Automated Flight Service Stations (AFSS).

The ICSS I (installed in the ATCT) provides the air traffic control (ATC) operational ground-ground voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/air traffic control system command center (ATCSCC) specialists. Ground-air radio connectivity between ATCT controllers and pilots is also supported by the ICSS I.

The ICSS I (installed in the TRACON) provides the ATC operational ground-ground voice communications interconnectivity between controllers within TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Ground-air radio connectivity between TRACON controllers and pilots is also supported by the ICSS I.

The ICSS I (installed in the AFSS) provides the ATC operational ground-ground voice communications interconnectivity between specialists within an AFSS (intercom), interconnectivity between specialists in separate AFSSs (interphone), and interconnectivity between Flight Service Station (FSS) specialists and Air Route Traffic Control Center (ARTCC) controllers/TRACON controllers/ATCT controllers/Air Traffic Control System Command Center (ATCSCC) specialists. Ground-air radio connectivity between AFSS specialists and pilots is also supported by the ICSS I.

Integrated Communications Switching System Type II (key system)

The Integrated Communications Switching System Type II (ICSS II) are installed at Airport Traffic Control Towers (ATCT), Automated Flight Service Stations(AFSS), and Terminal Radar Approach Control (TRACON) facilities.

The ICSS II (installed in the ATCT) provides the air traffic control (ATC) operational ground-ground voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Ground-air radio connectivity between ATCT controllers and pilots is also supported by the ICSS II.

The ICSS II (installed in the TRACON) provides the ATC operational ground-ground voice communications interconnectivity between controllers within TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC)) controllers/ Flight Service Station (FSS) specialists/air traffic control system command center (ATCSCC) specialists. Ground-air radio connectivity between TRACON controllers and pilots is also supported by the ICSS II.

Integrated Communications Switching System Type III (key system)

The Integrated Communications Switching System Type III (ICSS III) is installed at Automated Flight Service Stations (AFSS). The ICSS III (installed in the AFSS) provides the air traffic control (ATC) operational ground-to-ground (G/G)voice communications interconnectivity between specialists within an AFSS (intercom), interconnectivity between specialists in separate AFSSs (interphone), and interconnectivity between Flight Service Station (FSS) specialists and Air Route Traffic Control Center (ARTCC) controllers/Terminal Radar Approach Control (TRACON) controllers/ATCT controllers/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between AFSS specialists and pilots is also supported by the ICSS III.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS II systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Model One Full Capacity (key system)

The Model One Full Capacity (M1FC) system, located at Automated Flight Service Stations (AFSS), interface with a Flight Service Data Processing System (FSDPS) at FAA Air Route Traffic Control Centers (ARTCC). The M1FC is an information processing system used by Flight Service Specialists to collect and distribute Notice to Airmen (NOTAM), weather information, and flight plan related data to General Aviation pilots. In addition, the system supports the timely initiation of search and rescue processing and the capability to reconstruct system events based on time, terminal, or aircraft information.

Next-Generation Air/Ground Communications System Cockpit Display Unit (key system)

The Next-Generation Air/Ground Communications System Cockpit Display Unit (NEXCOM CDU) displays NEXCOM messages in aircraft cockpit. This display may be a standalone device or may be part of a multifunction, switchable, display unit.

Next-Generation Air/Ground Communications System Communication Management Unit (key system)

The Next-Generation Air-Ground Communications System Communication Management Unit (NEXCOM CMU) is a device that routes data to and from the NEXCOM radios, and incoming data to the appropriate cockpit display. This may be a standalone unit, part of a multifunctional display (MFD) or it may be implemented as part of a Flight Management System (FMS).

Operational and Supportability Implementation System (key system)

Operational and Supportability Implementation System (OASIS): The capabilities provided by the OASIS include alphanumeric and graphic weather product acquisition and display, flight plan processing, search and rescue services, and law enforcement support. The OASIS provides a real-time, multi-user, computer-based system that provides current weather information, forecast weather information, Notice to Airmen (NOTAM) information, and flight planning.

OASIS also supports flight service specialists at International Automated Flight Service Stations (IAFSS) that provide services associated with aircraft transiting the oceans.

Peripheral Adapter Module Replacement Item (key system)

The Peripheral Adapter Module Replacement Item (PAMRI) is an interface peripheral to the HOCSR. It provides a conduit through which the HOCSR receives and exchanges data, primarily radar data, flight data and interfacility data. The PAMRI converts communication protocols and translates data formats so the Host and EDARC can communicate with external devices.

Power Systems

The Power Systems (Pwr Sys) mechanism provides for the conditioning of commercial power, including uninterruptible power systems (UPS), to eliminate voltage dropouts, surges, and voltage sags caused by sources outside the facility. Power distribution, grounding, bonding and shielding of electrical system within the facility is also part of the Pwr Sys.

The Power Systems (Pwr Sys) mechanism provides the following: 1.) ACEPS Busway Replacements, 2.) ACEPS EG Maintenance, 3.) ACEPS Monitoring & Diagnostics, 4.) ACEPS Fuel System Upgrade, 5.) ACEPS Training, 6.) Battery Monitoring, 7.) Training Facility, 8.) CPDS, 9.) Battery Replacements, 10.) DC Systems, 11.) EG, 12.) LPGBS, 13.) Power Cable, 14.) UPS, 15.) Contract Support.

Rapid Deployment Voice Switch Type I (key system)

The Rapid Deployment Voice Switch Type I (RDVS I) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS I (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the RDVS I. The RDVS I (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the RDVS I.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS I systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Rapid Deployment Voice Switch Type II (key system)

The Rapid Deployment Voice Switch Type II (RDVS II) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS II (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the RDVS II. The RDVS II (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the RDVS II.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS II systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Rapid Deployment Voice Switch Type IIA (key system)

The Rapid Deployment Voice Switch Type IIA (RDVS IIA) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS IIA (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. The RDVS IIA also supports air-to-ground (A/G) radio connectivity between ATCT controllers and pilots. The RDVS IIA (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between TRACON controllers and pilots is also supported by the RDVS IIA.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS IIA systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Satellite Communication Airborne Radios

The Satellite Communication (SATCOM) airborne radios are transceivers installed in commercial, cargo, and military aircraft transiting in the National Airspace System (NAS) and are used as an alternate means of voice communications between pilots in aircraft and ground controllers. These transceivers are typically used in transoceanic applications.

Satellite Communication Ground Radios

Satellite Communications (SATCOM) Ground Radios are transceivers installed at oceanic and en route facilities to support an alternative means of tactical air traffic control (ATC) voice communications between ground controllers and pilots in aircraft. These transceivers are typically used in transoceanic applications. These transceivers are also installed at regional facilities and used as an alternate means of communications in case of total ground communications failure or between locations in mountainous terrain or where other means of communications are not possible (e.g., Alaska).

Oceanic air to ground satellite communications are provided via a communications service provider. The FAA currently has no plans to develop or implement its own air to ground SATCOM ground radios.

Satellite Telecommunications Data Link

Oceanic Centers use Satellite Telecommunications Data Link (SATCOM DL) mechanism transfer data between ground stations and aircraft. The FAA contracts for the satellite communications services and uses FANS-1A applications in the Oceanic automation system.

The FAA has no plans to develop its own SATCOM air to ground communications system.

Standard Terminal Automation Replacement System (key system)

The Standard Terminal Automation Replacement System (STARS) processes primary and secondary radar information to acquire and track data points to display aircraft position for controllers. STARS provides safety tools such as, conflict alert (CA), Mode C intruder (MCI), final monitoring aid (FMA), Minimum Safe Altitude Warning (MSAW), Converging Runway Display Aid (CARDA), and Controller Automated Spacing Aid (CASA). Also, STARS provides the capability to implement the following enhancements: improved radar processing, Global Positioning System (GPS) compatibility, adaptive routing, Center Terminal Radar Approach Control (TRACON) Automation System (CTAS), data link implementation, improved weather display, and better utilization of traffic management information.

Systems Atlanta Information Display System (key system)

A Systems Atlanta Information Display System (SAIDS) enables users to collect and/or input, organize, format, update, disseminate, and display both static and real-time data regarding weather and other rapidly changing critical information to air traffic controllers and Air Traffic Control (ATC) supervisors/Managers. SAIDS is installed at Airport Traffic Control Towers (ATCT), Terminal Radar Approach Control (TRACON) facilities, Air Route Traffic Control Centers (ARTCC), regional offices, and Flight Service Station (FSS) facilities.

Tower Data Link System Refresh (key system)

The Tower Data Link System (TDLS) automates tower-generated information for transmission to aircraft via data link. TDLS interfaces with sources of local weather data and flight data and provides Pre-Departure Clearance (PDC) and Digital-Automatic Terminal Information System (D-ATIS). PDC helps tower clearance delivery specialists compose and deliver departure clearances. The information is then transmitted in text form via the Aircraft Communication and Reporting System (ACARS) to an ACARS- equipped aircraft for review and acknowledgment by the flight crew.

Incorporating Digital-ATIS (D-ATIS) into TDLS allows: (1) Real-time ATIS updates throughout the NAS (2) Text message printouts, vise hand written recordings (3) Pilots to receive destination ATIS information, prior to take-off. For example, receive ATL''s ATIS broadcast while sitting in ORD. This list is not all-inclusive.

Ultra High Frequency Airborne Radios (key system)

The Ultra High Frequency Avionics (UHF Avionics) are analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225-400 MHz frequency band, which are multi-channel transceivers, installed in an airborne military platform. These airborne devices support the tactical two-way voice communications/ coordination between the military pilot in the military aircraft and the controller on the ground.

Ultra High Frequency Ground Radios (key system)

Ultra High Frequency (UHF) Ground Radios are analog UHF amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 Mhz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and flight service station domains.

Very High Frequency / Ultra High Frequency Emergency Communications Transceivers - Terminal (key system)

Very High Frequency / Ultra High Frequency Emergency Communications Transceivers - Terminal (VHF/UHF ECT - Terminal) are analog VHF and UHF transceivers operating in either the 118 - 137 Mhz or 225 - 400 Mhz frequency bands. These transceivers are used in the terminal domain as emergency communications.

Very High Frequency Airborne Radios (key system)

Very High Frequency (VHF) Airborne Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 Mhz frequency band which are multi-channel transceivers installed in an airborne platform (e.g., commercial, cargo, and general aviation aircraft). These airborne devices support the tactical two-way voice communications/coordination between the pilot in the aircraft and the controller on the ground.

Very High Frequency Ground Radios (key system)

Very High Frequency (VHF) Ground Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 MHz frequency band which are single-channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the pilot in commercial, cargo, or general aviation aircraft in the oceanic, en route (i.e., ARTCC), terminal (i.e., TRACON/tower), and flight service station domains. Additionally, there are analog VHF frequency modulation (VHF - FM) radio devices operating in the 161 - 174 MHz frequency band that are multi-channel transceivers. These transceivers are used by flight inspection, aviation security, and airway facility specialists supporting local airport operations and maintenance or to perform their operational maintenance mission in support of the NAS. However, these same VHF-FM transceivers are also used to support the resolution of emergency situations or establish a level of voice command and control communications/coordination during disaster recovery.

Very High Frequency Mobile Radios (key system)

Very High Frequency (VHF) Mobile Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 Mhz frequency band which are multi-channel transceivers installed in surface vehicles (e.g., "follow-me," maintenance, administrative, and snow-removal vehicles). These devices support the tactical two-way voice communications/coordination between the operators in the vehicles and the tower controllers or airline operations personnel.

Very High Frequency Multi-Mode Airborne Radios (key system)

Very High Frequency Multi-Mode Airborne Radios (VHF MM Airborne Radios) refers to an airborne radio operating in the very high frequency (VHF) range capable of operating in the following modes: (1)) analog voice (i.e., 25 kHz spacing for use in the United States and other similarly equipped countries); (2) VHF Digital Link Mode 2 (VDL Mode-2) (two-way digital data transmission); (3) VHF Digital Link Mode 3 (VDL Mode-3), (integrated two-way digital voice/data transmission); and (4) analog voice (i.e., 8.33 kHz spacing for use in Europe and other similarly equipped countries).

Very High Frequency Omnidirectional Range (key system)

The Very High Frequency Omnidirectional Range (VOR) is a ground-based radio navigation aid that broadcasts azimuth information to aircraft. VORs broadcast on assigned channels and include the facility identification in Morse code for pilot monitoring and verification. Some VORs are capable of broadcasting weather information and supporting pilot-controller communcations although these capabilities are typically provided by other infrastructure systems. In addition to providing en route and terminal area azimuth guidance, VORs also support nonprecision instrument approach operations.

Currently, VORs are the primary radio navigation aid in the National Airspace System (NAS). They serve as the internationally designated standard short-distance radio navigation aid for air carrier and general aviation Instrument Flight Rules (IFR) operations.

VORs may be installed stand-alone or co-located with either a DME or TACAN system. When co-located the facility is typically referred to as a VOR/DME or VORTAC facility, respectively. This configuration allows pilots to determine their aircraft''s bearing and distance to a single location, i.e., fix.

With the advent of space-based navigation capabilities, a planned reduction in operational VORs will begin in approximately 2010. The reduction will result in a "backbone" minimum operational network (MON) that will support IFR operations at the busiest airports in the NAS while serving as a backup for space-based navigation.

Voice Switching and Control System (key system)

The Voice Switching and Control System (VSCS) is installed in the Air Route Traffic Control Center (ARTCC). The VSCS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The VSCS provides the Air Traffic Control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ARTCC (intercom), interconnectivity between controllers in separate

ARTCCs (interphone), and interconnectivity between ARTCC controllers and Terminal Radar Approach Control (TRACON) controllers/Airport Traffic Control Tower (ATCT) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ARTCC controllers and pilots is also supported by the VSCS.

People

ARTCC Operational Manager In-charge

The ARTCC Operational Manager In-charge (AOMI) provides overall operational supervision to the Area Supervisors assigned to the shift. The AOMI, briefed by the TMU Supervisor on projected traffic for the shift, maintains situational awareness of traffic activities to ensure adequate staffing and optimal operational efficiency for the shift. The AOMI also logs equipment outages and assesses the impact on air traffic. He/she makes the decision to switch from the Host computer to DARC when necessary. The AOMI is also responsible for investigating immediate alerts for possible operational error or operational deviation, keeps immediate alert log up to date, records the outcome of each alert, and notifies Region and/or Headquarters of any occurrences that may become newsworthy. In addition, the AOMI signs for NOTAMS and ALNOTS and ensures proper dissemination.

Airline Operations Center Dispatcher

The Airline Operations Center Dispatcher (AOC Dispatcher) is a major airline employee that enters bulk flight plan requests and works with FAA by revising schedules and providing flight cancellations based on FAA provided data (aggregate demand lists, arrival rates, and parameters for anticipated ground delays.)

Flight Service Specialist

A Flight Service Specialist performs the following activities:

* Provide services to aircraft in flight and during the pre-flight phase,

* Monitoring and restoration of NAVAID; Issuing local airport advisories,

* Relaying ATC clearances, advisories or requests,

* Issuing military flight advisory messages,

* Receiving and issuing NOTAMS,

* Assisting is search and rescue communication searches,

* Activating and closing flight plans,

* Making unscheduled broadcasts,

* Soliciting and issuing PIREPS,

* Presenting pilot weather briefings to airborne aircraft,

* Locating lost aircraft,

* Recording aircraft contacts,

* Providing weather advisories and flight plan services,

* Providing hazardous area reporting services, and

* Keeping airmen and weather information current.

Ground Controller

A Ground Controller performs the following activities: Ensure separation; Control vehicles as well as aircraft on movement areas other than active runways Initiate control instructions; Monitor and operate communications equipment; Utilize tower radar display(s); Utilize alphanumerics; Assist the tower associate controller with coordination; Scan tower cab environment; Ensure computer entries and strip marking are completed for instructions or clearances issued or received; Process and forward flight plan information; Perform any functions of the tower team which will assist in meeting situation objectives; Coordinate with local control for safe and efficient use of runways and movement areas.

Local Controller

A Local Controller performs the following activities: Ensure separation; Control active runways; Initiate control instructions; Monitor and operate communications equipment; Utilize tower radar display(s); Utilize alphanumerics; Assist the tower associate controller with coordination; Scan tower cab environment; Ensure computer entries and strip marking are completed for instructions or clearances issued or received; Process and forward flight plan information; Perform any functions of the tower team which will assist in meeting situation objectives; Coordinate with ground control for safe and efficient use of runways and movement areas.

Meteorologist

Meteorologists provide accurate and timely weather information for FAA facilities within their area of responsibility. They analyze and interpret real-time weather data from radar, satellites and pilot reports as well as NWS products such as terminal and area forecasts, and in-flight advisories.

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization.

Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Radar Controller

A Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate automated handoffs; Assist the radar associate controller with non-automated handoff actions when needed; Assist the radar associate controller in coordination when needed; Scan radar display; Correlate with flight progress strip information; Ensure computer entries are completed on instructions or clearances you issue or receive; Ensure strip marking is completed on instructions or clearances you issue or receive.

Traffic Management Coordinators

Traffic Management Coordinators track and predict traffic flows, analyze ground delays, evaluate alternative routing strategies, and plan local traffic patterns at the local facility (ARTCC, TRACON, or Towers)

Traffic Management Specialist

Traffic Management Specialists perform the following activities: Balance air traffic demand with the airspace's capacity to maintain maximum and efficient utilization of the NAS; Coordinate and implement traffic management directives if needed for area of responsibility; Monitor and balance traffic flows within the area of responsibility in accordance with traffic management directives; Evaluate effectiveness of traffic management directives and make necessary adjustments; Document delay information.

Interfaces

Automated Radar Terminal System - Model IIE ← (Track Data) → Peripheral Adapter Module Replacement Item

The ARTS IIE provides terminal surveillance data to ARTCC's via PAMRI.

Automated Radar Terminal System - Model IIIA — (Track Data) → Enhanced Traffic Management System

Automated Radar Terminal System - Model IIIA — (Flight Data) → Host Computer System

The ARTS IIIA provides flight data to HCS via PAMRI.

Automated Radar Terminal System - Model IIIA — (Track Data) → Host Computer System

The ARTS IIIA provides surveillance data to HCS via PAMRI.

Automated Radar Terminal System - Model IIIA ← (Track Data) → Peripheral Adapter Module Replacement Item

The ARTS IIIA provides surveillance data to ARTCC's via PAMRI.

Automated Radar Terminal System - Model IIIE — (Track Data) → Enhanced Traffic Management System

Automated Radar Terminal System - Model IIIE — (Flight Data) → Host Computer System

The ARTS IIIE provides flight data to HCS via PAMRI.

Automated Radar Terminal System - Model IIIE — (Track Data) → Host Computer System

The ARTS IIIE provides surveillance data to HCS via PAMRI.

Automated Radar Terminal System - Model IIIE ← (Track Data) → Peripheral Adapter Module Replacement Item

The ARTS IIIE provides surveillance data to ARTCC's via PAMRI.

Automated Surface Observing System Controller Equipment - Information Display System — (Flight Data) → Automated Surface Observing System Controller Equipment - Information Display System

Routes to distributed and remote sites (IDS-4) flight progress information.

Automated Surface Observing System Controller Equipment - Information Display System — (NAS Status Data) → Automated Surface Observing System Controller Equipment - Information Display System

Provides near real-time status assessment of NAS resources and flight path conditions.

Automated Surface Observing System Controller Equipment - Information Display System — (Weather Data) → Automated Surface Observing System Controller Equipment - Information Display System

Routes to distributed and remote sites (IDS-4) temperature, dew point, windshear and direction, microburst detection and gust fronts, precipitation, thunderstorms cell motion, hail, tornado, lightning, runway visibility, relative humidity, altimeter setting, cloud heights, barometric pressure, NEXRAD radar mosaic, and turbulence.

Enhanced Terminal Voice Switch ← (Voice Communication) → Enhanced Terminal Voice Switch

This interface enables ATC voice communication between controllers in same or different facilities.

Enhanced Terminal Voice Switch ← (Voice Communication) → Integrated Communications Switching System Type I

This interface enables ATC voice communication between controllers in different facilities.

Enhanced Terminal Voice Switch ← (Voice Communication) → Integrated Communications Switching System Type II

This interface enables ATC voice communication between controllers in different facilities.

Enhanced Terminal Voice Switch ← (Voice Communication) → Integrated Communications Switching System Type III

This interface enables ATC voice communication between controllers in different facilities.

Enhanced Terminal Voice Switch ← (Voice Communication) → Rapid Deployment Voice Switch Type I

This interface enables ATC voice communication between controllers in different facilities.

Enhanced Terminal Voice Switch ← (Voice Communication) → Rapid Deployment Voice Switch Type II

This interface enables ATC voice communication between controllers in different facilities.

Enhanced Terminal Voice Switch ← (Voice Communication) → Rapid Deployment Voice Switch Type IIA

This interface enables ATC voice communication between controllers in different facilities.

Enhanced Terminal Voice Switch ← (Voice Communication) → Ultra High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Enhanced Terminal Voice Switch ← (Voice Communication) → Very High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Enhanced Terminal Voice Switch ← (Voice Communication) → Voice Switching and Control System

This interface enables ATC voice communication between controllers in different facilities.

Enhanced Traffic Management System ← (Flight Data) → Enhanced Traffic Management System

Enhanced Traffic Management System ← (Track Data) → Enhanced Traffic Management System

Enhanced Traffic Management System ← (Weather Data) → Enhanced Traffic Management System

Flight Data Input/Output — (Flight Data) → Automated Surface Observing System Controller Equipment - Information Display System

Provides flight progress information.

Flight Data Input/Output ← (Flight Data) → Flight Data Input/Output

The FDIOs in ARTCCs, TRACONs, ATCTs, and two Oceanic centers (New York and Oakland) exchange flight data with FDIOs in other ARTCCs, FDIOs TRACONs, ATCTs, and two Oceanic Centers (New York and Oakland).

Flight Data Input/Output ← (Flight Data) → Peripheral Adapter Module Replacement Item

The FDIO systems communicate flight data to PAMRI.

Host Computer System ⇐ (Flight Data) ⇒ Display System Replacement

The HCS sends flight data, time data, traffic management advisories to the DSR display and sends flight plans to the Flight Strip Printer. HCS receives flight plan amendments from ATC via entries on the R-position DSR.

Host Computer System ⇐ (Track Data) ⇒ Display System Replacement

The HCS sends target fixes and track data to DSR and receives re-assignment of surveillance to sectors from ATCs as needed. (Note: the type of data passed to DSR is not raw surveillance data but rather is Target (fixes) and track (series of fixes) data produced by the HCS RDP.

Host Computer System — (Weather Data) ⇒ Display System Replacement

The HCS sends alphanumeric weather data to the DSR. Note: This is different from weather graphics, which is displayed on the DSR D-position from WARP.

Integrated Communications Switching System Type I ⇐ (Voice Communication) ⇒ Integrated Communications Switching System Type I

This interface enables ATC voice communication between controllers in same or different facilities.

Integrated Communications Switching System Type I ⇐ (Voice Communication) ⇒ Integrated Communications Switching System Type II

This interface enables ATC voice communication between controllers in different facilities.

Integrated Communications Switching System Type I ⇐ (Voice Communication) ⇒ Integrated Communications Switching System Type III

This interface enables ATC voice communication between controllers in different facilities.

Integrated Communications Switching System Type I ⇐ (Voice Communication) ⇒ Rapid Deployment Voice Switch Type I

This interface enables ATC voice communication between controllers in different facilities.

Integrated Communications Switching System Type I ⇐ (Voice Communication) ⇒ Rapid Deployment Voice Switch Type II

This interface enables ATC voice communication between controllers in different facilities.

Integrated Communications Switching System Type I ⇐ (Voice Communication) ⇒ Rapid Deployment Voice Switch Type IIA

This interface enables ATC voice communication between controllers in different facilities.

Integrated Communications Switching System Type I ⇐ (Voice Communication) ⇒ Ultra High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Integrated Communications Switching System Type I ⇐ (Voice Communication) ⇒ Very High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Integrated Communications Switching System Type I ⇐ (Voice Communication) ⇒ Voice Switching and Control System

This interface enables ATC voice communication between controllers in different facilities.

Integrated Communications Switching System Type II ⇐ (Voice Communication) ⇒ Integrated Communications Switching System Type II

This interface enables ATC voice communication between controllers in same or different facilities.

Integrated Communications Switching System Type II ⇐ (Voice Communication) ⇒ Integrated Communications Switching System Type III

This interface enables ATC voice communication between controllers in different facilities.

Integrated Communications Switching System Type II ⇐ (Voice Communication) ⇒ Rapid Deployment Voice Switch Type I

This interface enables ATC voice communication between controllers in different facilities.

Integrated Communications Switching System Type II ⇐ (Voice Communication) ⇒ Rapid Deployment Voice Switch Type II

This interface enables ATC voice communication between controllers in different facilities.

Integrated Communications Switching System Type II ⇐ (Voice Communication) ⇒ Rapid Deployment Voice Switch Type IIA

This interface enables ATC voice communication between controllers in different facilities.

Integrated Communications Switching System Type II ⇐ (Voice Communication) ⇒ Ultra High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Integrated Communications Switching System Type II ⇐ (Voice Communication) ⇒ Very High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Integrated Communications Switching System Type II ⇐ (Voice Communication) ⇒ Voice Switching and Control System

This interface enables ATC voice communication between controllers in different facilities.

Integrated Communications Switching System Type III ⇐ (Voice Communication) ⇒ Integrated Communications Switching System Type III

This interface enables ATC voice communication between controllers in same or different facilities.

Integrated Communications Switching System Type III ⇐ (Voice Communication) ⇒ Rapid Deployment Voice Switch Type I

This interface enables ATC voice communication between controllers in different facilities.

Integrated Communications Switching System Type III ⇐ (Voice Communication) ⇒ Rapid Deployment Voice Switch Type II

This interface enables ATC voice communication between controllers in different facilities.

Integrated Communications Switching System Type III ⇐ (Voice Communication) ⇒ Rapid Deployment Voice Switch Type IIA

This interface enables ATC voice communication between controllers in different facilities.

Integrated Communications Switching System Type III ⇐ (Voice Communication) ⇒ Ultra High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Integrated Communications Switching System Type III ⇐ (Voice Communication) ⇒ Very High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Integrated Communications Switching System Type III ⇐ (Voice Communication) ⇒ Voice Switching and Control System

This interface enables ATC voice communication between controllers in different facilities.

Operational and Supportability Implementation System ⇐ (Flight Data) ⇒ Peripheral Adapter Module Replacement Item

The OASIS currently exchanges flight plans and SAR requests with HCS via PAMRI.

Peripheral Adapter Module Replacement Item — (Track Data) ⇒ Enhanced Traffic Management System

Peripheral Adapter Module Replacement Item — (Flight Data) ⇒ Host Computer System

The PAMRI is a conduit through which the HCS receives and exchanges flight data with remote FDIO flight strip printer system (printer/display/keyboard) as well as with external automation systems such as ARTS/STARS (TRACON), ODAPS/FDP2000 (Ocean), and FSM (ATCSCC). FDIO uses the General Purpose Input/Output (GPI/O) parallel interfaces and automation systems use the Interfacility Communications Input/Output (INTI/O) serial interfaces.

Peripheral Adapter Module Replacement Item — (Surveillance Data) ➔ Host Computer System
The PAMRI passes surveillance data from the primary/secondary radars to the HCS for processing and use in controlling aircraft.
Peripheral Adapter Module Replacement Item — (Flight Data) ➔ Peripheral Adapter Module Replacement Item
The PAMRI passes flight data between ARTCCs.
Peripheral Adapter Module Replacement Item — (Track Data) ➔ Peripheral Adapter Module Replacement Item
The PAMRI passes track data between ARTCCs.
Rapid Deployment Voice Switch Type I ← (Voice Communication) ➔ Rapid Deployment Voice Switch Type I
This interface enables ATC voice communication between controllers in same or different facilities.
Rapid Deployment Voice Switch Type I ← (Voice Communication) ➔ Rapid Deployment Voice Switch Type II
This interface enables ATC voice communication between controllers in different facilities.
Rapid Deployment Voice Switch Type I ← (Voice Communication) ➔ Rapid Deployment Voice Switch Type IIA
This interface enables ATC voice communication between controllers in different facilities.
Rapid Deployment Voice Switch Type I ← (Voice Communication) ➔ Ultra High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Rapid Deployment Voice Switch Type I ← (Voice Communication) ➔ Very High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Rapid Deployment Voice Switch Type I ← (Voice Communication) ➔ Voice Switching and Control System
This interface enables ATC voice communication between controllers in different facilities.
Rapid Deployment Voice Switch Type II ← (Voice Communication) ➔ Rapid Deployment Voice Switch Type II
This interface enables ATC voice communication between controllers in same or different facilities.
Rapid Deployment Voice Switch Type II ← (Voice Communication) ➔ Rapid Deployment Voice Switch Type IIA
This interface enables ATC voice communication between controllers in different facilities.
Rapid Deployment Voice Switch Type II ← (Voice Communication) ➔ Ultra High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Rapid Deployment Voice Switch Type II ← (Voice Communication) ➔ Very High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Rapid Deployment Voice Switch Type II ← (Voice Communication) ➔ Voice Switching and Control System
This interface enables ATC voice communication between controllers in different facilities.
Rapid Deployment Voice Switch Type IIA ← (Voice Communication) ➔ Rapid Deployment Voice Switch Type IIA
This interface enables ATC voice communication between controllers in same or different facilities.
Rapid Deployment Voice Switch Type IIA ← (Voice Communication) ➔ Ultra High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Rapid Deployment Voice Switch Type IIA ← (Voice Communication) ➔ Very High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Rapid Deployment Voice Switch Type IIA ← (Voice Communication) ➔ Voice Switching and Control System
This interface enables ATC voice communication between controllers in different facilities.
Standard Terminal Automation Replacement System — (Track Data) ➔ Enhanced Traffic Management System
Standard Terminal Automation Replacement System — (Flight Data) ➔ Host Computer System
The STARS provides flight data to ARTCCs via HCS.
Standard Terminal Automation Replacement System — (Track Data) ➔ Host Computer System
The STARS provides flight data to ARTCCs via HCS.
Standard Terminal Automation Replacement System — (Track Data) ➔ Peripheral Adapter Module Replacement Item
Flight data, track data, test data, and responses are exchanged between terminal and en route and between terminal and adjacent terminal.
Ultra High Frequency Ground Radios ← (Voice Communication) ➔ Ultra High Frequency Airborne Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Very High Frequency Ground Radios ← (Voice Communication) ➔ Very High Frequency Airborne Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Very High Frequency Ground Radios ← (Voice Communication) ➔ Very High Frequency Mobile Radios
Voice communication providing ATC coordination and direction between controllers and pilots and between controllers and ground vehicle operators.
Very High Frequency Ground Radios ← (Voice Communication) ➔ Very High Frequency Multi-Mode Airborne Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Voice Switching and Control System ← (Voice Communication) ➔ Ultra High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Voice Switching and Control System ← (Voice Communication) ➔ Very High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Voice Switching and Control System ← (Voice Communication) ➔ Voice Switching and Control System
This interface enables ATC voice communication between controllers in same or different facilities.

Issues

none identified

Service Group Air Traffic Services
Service ATC-Advisory
Capability NAS Status Advisory
Operational Improvement

Provide National Flight Information Service (103305)

Improving the ability of equipped aircraft to access aeronautical information during flight is essential. Pilots require integrated and affordable flight information services, through implementation of a national Flight Information Services Broadcast.
31-Jan-2016 to 31-Jan-2023

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Introducing many enhancements including improved collection, management, and distribution of National Airspace System

(NAS) status data results in more timely and complete flight information. The Aeronautical Information Management (AIM) system is the focal point in collecting and managing NAS status information and packaging it for distribution. The data is distributed NAS-wide via System Wide Information Management (SWIM) and the Flight Information Service-Broadcast (FIS-B). FIS-B reduces frequency congestion in the en route and arrival/departure environments.

AIM collects system status data from the Maintenance Management System; from pilot reports received via Next Generation Air/Ground Communication System and the Communications Management System ; and from many other sources via SWIM. AIM also collects Special Use Airspace (SUA) status and route information from the Flight Object Management System or Next Generation - Traffic Flow Management and weather information from the General Weather Processor.

AIM distributes NAS status data to users at Air Traffic Control facilities and Airline Operation Centers via SWIM. Federal Aviation Administration (FAA) users access SWIM through the SWIM Management Unit. NAS status data is displayed to all FAA users on a common display, the Integrated Information Workstation.

NAS status data is distributed to properly equipped aircraft via the Ground Based Transceiver (GBT) data link. GBTs cover the airport surface, arrival/departure airspace, and en route airspace. They are installed at 900 locations, including all secondary surveillance sites and 140 airports (4 stations each) to support FIS-B via the Universal Access Transceiver data links. The GBTs also support automatic dependent surveillance-broadcast and traffic information service-broadcast. The FAA continues to provide data to non-equipped aircraft per current procedures.

NAS status advisory data includes braking action and surface advisories, airport configuration, runway availability, runway visual range, equipment outages, SUA status, updates to terrain and obstacles, Notice to Airmen, hazardous weather warnings, updated charts, updated airport frequencies, the controlled flight into terrain database, arrival/departure status, and moving map information.

Benefits

Safety is enhanced because the pilot has real-time access to data-linked information on the configuration and availability of NAS resources. Controller provided voice advisories are needed less frequently, thus improving efficiency.

Systems

Aeronautical Information Management (key system)

The AIM system represents the evolution of the acquisition, storage, processing and dissemination of aeronautical information in the NAS. Aeronautical information is defined as any information concerning the establishment, condition, or change in any component (facility, service, or procedure of, of hazard) of the National Airspace System. Aeronautical information comes in two types a somewhat static type, and a more dynamic type. The static portion represents the aeronautical information baseline as a particular date, while the dynamic portion updates particular aspects of the static portion due to system impacts or events. The Static portion represents data that NAS automation systems and other users use to adapt their software to properly operate. The dynamic portion represents information typically contained in NOTAMs that indicate short-term changes to the static data.

Many NAS systems support the acquisition, generation, and dissemination of the static aeronautical information. Information of this type includes airspace structures, airways, locations of NAS facilities, inter-facility letters of agreement and memorandums of understanding, obstructions, standard procedures, airspace charts, etc.

Several NAS systems also support the acquisition, generation, processing, and dissemination of the dynamic aeronautical information. Information of this type includes, facility outages, runway closures, temporary flight restrictions, airspace constraints, SIGMETs, etc. This information must be disseminated to users and providers of air traffic services in a timely and efficient manner.

AIM will provide the central point for the dissemination of high quality, configuration controlled information to NAS systems, service providers and users of the NAS. AIM will disseminate data based on the Aeronautical Information Exchange Model (AIXM) protocols.

Automatic Dependent Surveillance - Broadcast Avionics (key system)

Automatic Dependent Surveillance-Broadcast Avionics (ADS-B Avionics) transmits and receives Global Positioning System (GPS)-derived aircraft 4-dimensional position data, aircraft identification, aircraft velocity, and other selected aircraft data. Augmented GPS data may be required for certain applications. This is intended to be a surveillance system and not an avoidance system. The broadcast of own position is automatic and is intended to provide surveillance information to other users. The aircraft or vehicle originating the broadcast may not have knowledge of which users are receiving its broadcast. The ADS-B avionics are designed to transmit this 4-dimensional position data of own aircraft or vehicle and to also receive same type of information from others that are similarly equipped to receive and process ADS-B surveillance information.

Digital Voice Recorder System

Provides modern digital voice recording devices used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

In Feburary 2004, the DVRS was upgraded with a 24-channel card, which replaced the 16-channel card. This minor upgrade, called DVR II, was not extended to the systems installed prior to February 2004.

Digital Voice Recorder System Replacement

The Digital Voice Recorder System Replacement (DVRS Replacement) is a modern digital system used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

Flight Object Management System - En Route (key system)

The FOMS is a component of the Standard Automation Platform (SAP). The FOMS processes flight data received from multiple sources via the System Wide Information Management (SWIM) Management Unit. The FOMS also receives track data from the Surveillance Data Processor and associates tracks with flight data, producing the flight object, which is published to SWIM for subscriber use. Flight plan support functionality includes end-to-end profile evaluation in all phases of flight and evaluation against static and dynamic constraints (terrain, obstacles, airspace restrictions, etc.). The FOMS supports flight planning up to 180 days prior to day of flight. A user can access the flight object from initial to closeout in the same manner. The FOMS provides end-to-end flight data management from preflight to post analysis. Ownership of the flight object begins and ends with Traffic Flow Management and transitions during the flight to clearance delivery, ramp, surface, departure, transition to cruise, cruise, transition to arrival, and ramp. Flight data management is based on trajectory, assigned volumes, and "necessary" route structure.

Flight Object Management System - Terminal (key system)

The FOMS is a component of the Standard Automation Platform (SAP). The FOMS processes flight data received from multiple sources via the System Wide Information Management (SWIM) Management Unit. The FOMS also receives track data from the Surveillance Data Processor (SDP) and associates tracks with flight data, producing the flight object, which is published to SWIM for subscriber use. Flight plan support functionality includes end-to-end profile evaluation in all phases of flight and evaluation against static and dynamic constraints (terrain, obstacles, airspace restrictions, etc.). The FOMS supports flight planning up to 180 days prior to day of flight. A user can access the flight object from initial to closeout in the same manner. The FOMS provides end-to-end flight data management from preflight to post analysis. Ownership of the flight object begins and ends with Traffic Flow Management and transitions during the flight to clearance delivery, ramp, surface, departure, transition to cruise, cruise, transition to arrival, and ramp. Flight data management is based on trajectory, assigned volumes, and "necessary" route structure.

General Weather Processor (key system)

The GWP collects, analyzes, tailors, displays, and distributes weather products. The GWP receives weather data from multiple sensors and distributes processed and tailored weather information via System Wide Information Management. The GWP provides a standard set of algorithms and access to data/products that convey current and future status of impacting weather to all National Airspace System services.

Integrated Information Workstation - Build 1 (key system)

IIW Build 1 will include the infrastructure and system interfaces to acquire, analyze, store, update, display, and manage the following information in an integrated manner: (1) National Airspace System (NAS) aeronautical, (2) airport environmental, (3) airborne and surface surveillance, (4) flight information, (5) weather information, and (6) NAS status. Build 1 will also replace its predecessor system, FAA Data Display System, as well as interface with the following systems in support of its mission: Flight Object Management, System Wide Information Management, Next Generation- Traffic Flow Management, Maintenance Management System, Unified Decision Management System, and Aeronautical Information Management.

National Airspace System Infrastructure Management System Phase 2

National Airspace System Infrastructure Management System (NIMS) Phase 2 will enhance resource and enterprise management, by developing NAS customer and user interaction tools, and providing additional performance and cost trend analysis. The NIMS will provide status information to all NAS users in near real time via the System Wide Information Management (SWIM) system. NIMS Phase 2 will enhance NIMS Phase 1 by providing the tools to achieve the concept of NAS Infrastructure Management (NIM). This new approach to the operation and maintenance of the NAS infrastructure will incorporate a performance-based service management approach that is focused on achieving user and customer satisfaction and managing NAS infrastructure services. The key characteristics of the NIM concept are: 1. Consolidating expertise in control centers to provide rapid, effective response to customer needs, support centralized operational control, and gain efficiencies. 2. Centralized Remote Monitoring and Control of NAS infrastructure services and systems to provide efficient service delivery and systems management. 3. Nationwide Operations Planning to provide standardized field operations across the NAS to facilitate consistent interaction with customers. 4. Information Infrastructure to provide real-time information collection and distribution to provide common NAS performance metrics and cost accounting. 5. Performance Based Management to provide data for the prioritization of maintenance activities and investment decisions.

The NIMS Enterprise Management (EM) will monitor and control NAS subsystems, equipment, resources and the NIMS. An Enterprise Manager Suite, consisting of commercially available hardware and software components, is installed at each of the four Operations Control Centers. The NIMS Resource Manager (RM) will support all NIMS Resource Functions. The NIMS RM, consisting of commercially available hardware and software components, is installed at each of the four Operations Control Centers.

The NIMS Enterprise Manager will be integrated with the NIMS Resource Manager to provide, Automated Incident Ticketing, a Common Logging System, Real Time System Performance Monitoring, and a Centralized Logistics/Maintenance System.

Next Generation Traffic Flow Management (key system)

The Next Generation Traffic Flow Management (NG-TFM) system provides an array of automation and data processing tools for Traffic Management Specialists (TMS) and Traffic Management Coordinators (TMC), as well as a gateway that enables NAS users to make changes in flight schedules based on planned traffic initiatives (e.g., Ground Delay Programs) and other NAS data. This enhanced decision support system provides increased information exchange between FAA service providers and NAS users. NG-TFM receives flight schedules from NAS users (e.g., air carriers) and combines these with weather data, NAS status data, and planned traffic initiatives to generate detailed graphical and textual traffic displays as far as 24 hours into the future on both national and local scales. Features include both pre-flight and post-flight analysis tools, flight data archiving, enhanced traffic displays, traffic strategy (one or more initiatives) automation, "what if" strategy analysis, and automated TFM training tools.

NG-TFM is comprised of five different software component systems and will include a hardware and operating system software tech refresh. The complete NG-TFM software package includes changes to support interfaces with the Flight Object Management System (FOMS) and System Wide Information Management (SWIM). When complete, this will establish a new NG-TFM system baseline.

Power Systems

The Power Systems (Pwr Sys) mechanism provides for the conditioning of commercial power, including uninterruptible power systems (UPS), to eliminate voltage dropouts, surges, and voltage sags caused by sources outside the facility. Power distribution, grounding, bonding and shielding of electrical system within the facility is also part of the Pwr Sys.

The Power Systems (Pwr Sys) mechanism provides the following: 1.) ACEPS Busway Replacements, 2.) ACEPS EG Maintenance, 3.) ACEPS Monitoring & Diagnostics, 4.) ACEPS Fuel System Upgrade, 5.) ACEPS Training, 6.) Battery Monitoring, 7.) Training Facility, 8.) CPDS, 9.) Battery Replacements, 10.) DC Systems, 11.) EG, 12.) LPGBS, 13.) Power Cable, 14.) UPS, 15.) Contract Support.

System Wide Information Management Build 1B (key system)

Build 1B provides all items in 1A, including more NAS information. This build integrates Flight and Surveillance Information systems into the SWIM architecture.

TIS-FIS Broadcast Server (key system)

TIS-FIS Broadcast Servers are located at 22 Air Route Traffic Control Centers and 8 consolidated Terminal Radar Approach Controls/Integrated Control Complex (ICC). TIS-Broadcast (TIS-B) is needed unless full Automatic Dependent Surveillance-Broadcast equipage is achieved. Servers will receive surveillance data (i.e., based on Secondary Surveillance Radar, etc.), from the Surveillance Data Processor (SDP), in the form of Surveillance Data Objects for each target aircraft and will create TIS-B reports. Servers will receive FIS data from weather processors. The TIS and FIS data will be geographically filtered for the defined service volume of each Broadcast Services Ground Station (BSGS), and TIS data will also be filtered for only non-ADS-B-equipped targets.

Support Activities

AT Training for National Flight Information Service

Air Traffic (AT) training is provided to the AT workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AT Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

FAA Adaptation for National Flight Information Service

Many NAS systems incorporate parameters that are adjustable. This allows for the setting of system parameters to optimize performance at each particular site. When new systems that have adjustable parameters are introduced into the NAS, adaptation data must be developed for the system. Environmental and procedural changes may also result in the need to modify FAA Adaptation Data. Generally, adaptation will begin 12 months before IOC and continue until 12 months after IOC.

Non-FAA Training for National Flight Information Service

Non-FAA Training is provided to educate users and their workforces as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional pilot training. Training will generally begin 60 days prior to IOC and be complete within one year following Full Operating Capability.

People

ARTCC Operational Manager In-charge

The ARTCC Operational Manager In-charge (AOMI) provides overall operational supervision to the Area Supervisors assigned to the shift. The AOMI, briefed by the TMU Supervisor on projected traffic for the shift, maintains situational awareness of traffic activities to ensure adequate staffing and optimal operational efficiency for the shift. The AOMI also logs equipment outages and assesses the impact on air traffic. He/she makes the decision to switch from the Host computer to DARC when necessary. The AOMI is also responsible for investigating immediate alerts for possible operational error or operational deviation, keeps immediate alert log up to date, records the outcome of each alert, and notifies Region and/or Headquarters of any occurrences that may become newsworthy. In addition, the AOMI signs for NOTAMS and ALNOTS and ensures proper dissemination.

Airline Operations Center Dispatcher

The Airline Operations Center Dispatcher (AOC Dispatcher) is a major airline employee that enters bulk flight plan requests and works with FAA by revising schedules and providing flight cancellations based on FAA provided data (aggregate demand lists, arrival rates, and parameters for anticipated ground delays.)

Flight Service Station Personnel

Captures operations and maintenance (O&M) funding for wages and benefits of flight service personnel.

Ground Controller

A Ground Controller performs the following activities: Ensure separation; Control vehicles as well as aircraft on movement areas other than active runways Initiate control instructions; Monitor and operate communications equipment; Utilize tower radar display(s); Utilize alphanumerics; Assist the tower associate controller with coordination; Scan tower cab environment; Ensure computer entries and strip marking are completed for instructions or clearances issued or received; Process and forward flight plan information; Perform any functions of the tower team which will assist in meeting situation objectives; Coordinate with local control for safe and efficient use of runways and movement areas.

Meteorologist

Meteorologists provide accurate and timely weather information for FAA facilities within their area of responsibility. They analyze and interpret real-time weather data from radar, satellites and pilot reports as well as NWS products such as terminal and area forecasts, and in-flight advisories.

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Radar Controller

A Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate automated handoffs; Assist the radar associate controller with non-automated handoff actions when needed; Assist the radar associate controller in coordination when needed; Scan radar display; Correlate with flight progress strip information; Ensure computer entries are completed on instructions or clearances you issue or receive; Ensure strip marking is completed on instructions or clearances you issue or receive.

Traffic Management Coordinators

Traffic Management Coordinators track and predict traffic flows, analyze ground delays, evaluate alternative routing strategies, and plan local traffic patterns at the local facility (ARTCC, TRACON, or Towers)

Traffic Management Specialist

Traffic Management Specialists perform the following activities: Balance air traffic demand with the airspace's capacity to maintain maximum and efficient utilization of the NAS; Coordinate and implement traffic management directives if needed for area of responsibility; Monitor and balance traffic flows within the area of responsibility in accordance with traffic management directives; Evaluate effectiveness of traffic management directives and make necessary adjustments; Document delay information.

Interfaces

Aeronautical Information Management — (Data Communication) → Integrated Information Workstation - Build 1
AIM sends NOTAMS and other data to the IIW for display.

Aeronautical Information Management ← (NAS Status Data) → System Wide Information Management Build 1B
"AIM exchanges NAS Status data, including equipment status, airspace schedules and status, contingency routings, and RNP-RNAV routings, with other systems via SWIM.

Aeronautical Information Management — (Weather Data) → System Wide Information Management Build 1B
AIM provides PIREPS for distribution to NAS users via SWIM.

Automatic Dependent Surveillance - Broadcast Avionics ← (Target Data) → Automatic Dependent Surveillance - Broadcast Avionics
Air-to-air ADS-B target data is exchanged between aircraft for use initially as a situation awareness enhancement. This capability will be expanded to other future applications, such as precision approach and landing and self separation.

Flight Object Management System - En Route ← (Data Communication) → Integrated Information Workstation - Build 1
FOMS sends traffic management decision support tool information to IIW. The IIW serves as the controller interface to the tools.

Flight Object Management System - En Route ← (Flight Data) → Next Generation Traffic Flow Management
FOMS and NG-TFM exchange flight data.

Flight Object Management System - Terminal ← (Data Communication) → Integrated Information Workstation - Build 1
FOMS sends traffic management decision support tool information to IIW. IIW serves as the controller interface to the tools.

Flight Object Management System - Terminal ← (Flight Data) → Next Generation Traffic Flow Management
FOMS and NG-TFM exchange flight data.

General Weather Processor — (Weather Data) → System Wide Information Management Build 1B
GWP provides weather data to SWIM for distribution to users.

General Weather Processor — (Weather Data) → TIS-FIS Broadcast Server
GWP provides graphical weather information to the TIS-FIS Broadcast Server for processing pior to being sent to the BSGS for broadcasting.

Next Generation Traffic Flow Management — (Data Communication) → Integrated Information Workstation - Build 1
NG-TFM provides traffic flow management data to the IIW for display to controllers.

Next Generation Traffic Flow Management ← (Data Communication) → System Wide Information Management Build 1B
NG-TFM exchanges strategic flow data via SWIM.

System Wide Information Management Build 1B — (NAS Status Data) → Flight Object Management System - En Route
FOMS receives NAS status data via SWIM.

System Wide Information Management Build 1B — (Weather Data) → Flight Object Management System - En Route
FOMS receives weather products from GWP and other sources via SWIM.

System Wide Information Management Build 1B — (NAS Status Data) → Flight Object Management System - Terminal
FOMS receives NAS status data via SWIM.

System Wide Information Management Build 1B — (Weather Data) → Flight Object Management System - Terminal
FOMS receives weather products from GWP and other sources via SWIM.

System Wide Information Management Build 1B — (Flight Data) → Next Generation Traffic Flow Management
NG-TFM receives flight object data via SWIM.

System Wide Information Management Build 1B — (NAS Status Data) → Next Generation Traffic Flow Management
"NG-TFM receives NAS status data, including airspace changes and oceanic constraints, via SWIM.

System Wide Information Management Build 1B — (Weather Data) → Next Generation Traffic Flow Management
NG-TFM receives weather advisory data via SWIM.

Issues

The FIS-B service will be via the UAT data link only. The assumption is that the airlines will get NAS status, and weather data, via their FOCs as they do today. Only properly equipped aircraft will receive the FIS-B service.

Service Group Air Traffic Services
Service ATC-Advisory
Capability Traffic Advisory
Operational Improvement

Current Traffic Advisory (103201)

Traffic advisories alert aircraft to potential conflicts with other objects on the surface or in flight. For example, controllers transmit traffic advisories to aircraft or other flight objects that are in the proximity of hot air or gas balloons, missile launches, or other potential hazards. Traffic advisories for aircraft on the surface include the number, type, position, and intent of the ground traffic. Controllers provide the advisories to pilots via radio.
01-Jan-2007 to 31-Jul-2008

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Air traffic controllers radio traffic advisories to pilots. Advisories must be used in certain instances (e.g., merging target situations), but it is good operating practice to use them at all times. They help both controllers and pilots when two aircraft, in airspace or a surface area, are close together. Traffic advisories have the effect of reducing pilot-controller radio transmissions, and thus frequency congestion, by alerting the pilot of situations he/she might otherwise question. Radar Traffic Advisories FAA surveillance and automation systems provide data used in advisories to controllers, who view processed radar on one of several types of consoles, including the Display System Replacement for the Host Computer System (HCS) and the Automated Radar Terminal System display. Primary radar systems provide surveillance data generated by radar transmissions reflected back to the radar by the aircraft (i.e., primary radar returns, or "skin paint").

Secondary surveillance systems, also known as beacon systems, provide additional target information, including aircraft identification and altitude. Air traffic control automation systems process and correlate data from primary and secondary surveillance systems and display the resulting surveillance reports on the controller's display.

Data depict a primary radar target, a limited data block and target, or a full data block and target. A limited data block provides only beacon code data and altitude if available. A full data block provides the aircraft call sign, assigned altitude, reported altitude, ground-speed readout, and other data relevant to the aircraft. The controller uses the displayed data for, among other things, traffic advisories.

A primary radar target provides the least amount of information to the controller that can be passed as a traffic advisory. This type of target tells the controller only position information. A primary radar target can be identified, and the controller can obtain additional information if he/she is in contact with the aircraft. A limited data block can provide beacon code data and altitude if the aircraft has a Mode C (altitude encoding) transponder. If the controller is in contact with the aircraft, a limited data block provides the controller data to give a basic traffic advisory. A full data block and the associated flight progress strip also provide the data for a complete traffic advisory.

Non-radar Traffic Advisories Terminal and tower controllers give non-radar traffic advisories regarding known or observed traffic in the vicinity of airports. Likewise, en route controllers and Automated Flight Service Station (AFSS) specialists provide non-radar traffic advisories regarding known traffic. As with radar traffic advisories, this information assists both pilots and controllers because they share information and avoid unnecessary frequency congestion. Controllers often use this type of advisory to assist the pilot during arrival or departure.

Traffic Alert and Collision Avoidance System Advisories Federal Air Regulations require that foreign and domestic airlines and other similar transport aircraft be equipped with Traffic Alert and Collision Avoidance Systems (TCAS). This equipment enhances pilots to view surrounding aircraft and provides traffic and resolution advisories when necessary. The TCAS display identifies the location of other traffic by showing relative position and altitude of targets with altitude-encoding transponders. TCAS II also provides resolutions in the vertical plane.

Flight Data Certain information about each aircraft and its intended flight plan are useful to controllers in providing traffic advisories. The controller must know the aircraft's company call sign and flight number or the aircraft's registration number to communicate with the pilot. They must also know the aircraft's type to identify the aircraft to other aircraft, and to know flight capabilities for assigning routes of flight and altitude.

The flight data for traffic advisories, generally, in the format of an FAA flight plan, originates with the pilot or the pilot's company. The data enters the HCS through AFSSs, military base operations, Direct User Access Terminal System, commercial vendors on the Internet, air carrier or air taxi operations centers, prefiled flight plans, or directly from an FAA facility that has direct access to the NAS computer system.

The controller receives flight data through automated means. It is generally in the form of printed Flight Progress Strips from the Flight Data Input/Output equipment or from computer updates or readout messages.

Duty Priorities

When the radar targets of two aircraft will merge and vertical separation between the two aircraft is not more than the minimum required, the controller applies merging-target procedures, which include mandatory traffic advisories. The procedures are not required for non-turbojet aircraft below 10,000 feet; however, good operating technique calls for issuing a traffic advisory.

Traffic advisories, accept for the merging-target requirement, fall within the lower-priority additional services category. A controller's first priority is to separate aircraft and issue safety alerts, then he/she provides additional services. Thus, as a controller's workload increases, he/she may sometimes be forced to discontinue issuing traffic advisories.

Aircraft flying under visual flight rules can request radar traffic advisories (flight following) from an air traffic control facility. Controllers comply as the workload permits.

Benefits

Current operations are provided in the NAS.

Systems

Aeronautical Telecommunication Network Air to Ground Router (key system)

The Aeronautical Telecommunications Network (ATN) Air to Ground Router (ATN A/G Router) provides air/ground data communication complying with International Civil Aviation Organization (ICAO) Annex 10 formats.

The ATN Program Office, AOS-900, entered into an agreement with the Japanese Civil Aviation Bureau (JCAB) on February 12, 1998. This agreement initiated trial and connectivity testing to implement ATN and the FAA owned ATS Message Handling System (AMHS) service to support the anticipated additional air traffic demands in the Asia/Pacific region. The FAA and JCAB successfully conducted connectivity and interoperability testing during 2001.

OKI Electric Industry Co. LTD (OKI) developed ATN router software for use by the JCAB air traffic control system. This unique and proprietary OKI software follows strict international aviation development guidelines and uses the Windows NT operating system. The FAA employed the OKI router software during successful compatibility and interoperability testing with JCAB in 2001 and it was found to meet all the desired technical and operational requirements. The FAA uses the OKI router software for the international data service component of ATN and if used in the U.S. will provide an economy of scale, operational efficiency, interoperability and commonality of equipment.

The FAA is required to obtain the software and support drivers in March 2003 to meet the integration and security processes needed for the initiation of the service with Japan. The agreement between the FAA and JCAB specifies the need to have the system deployed by August 2003 in order to initiate ATN service by March 2004.

Note: This router does not currently support NEXCOM, but could possibly be used as the ATN Backbone required in the future.

Air Route Surveillance Radar - Model 1E (key system)

The Air Route Surveillance Radar - Model 1E (ARSR-1E) is a 1970s analog radar. It is a long-range radar system with a maximum detection range of 200 nm. The ARSR-1E is a surveillance system used to detect azimuth and slant range of en route aircraft operating between terminal areas. It also provides weather intensity data.

Air Route Surveillance Radar - Model 2 (key system)

The Air Route Surveillance Radar - Model 2 (ARSR-2) is a 1970s analog radar. It is a long-range radar system with a maximum detection range of 200 nm. The ARSR-2 is a surveillance system used to detect azimuth and slant range of en route aircraft operating between terminal areas. It also provides weather intensity data.

Air Route Surveillance Radar - Model 3 (key system)

The Air Route Surveillance Radar - Model 3 (ARSR-3) is a 1980s radar that provides primary long range surveillance data, including slant range and azimuth data. It processes the returns which includes demodulation, analog-to-digital conversion, moving target indicator function, sensitivity time control, range and azimuth gating, and digital target extraction - all of which are performed digitally (with the exception of the demodulation and analog-to-digital conversion). In addition, the ARSR-3 has a weather channel with associated processing to provide weather contour information in digital format.

Air Route Surveillance Radar - Model 4 (key system)

The Air Route Surveillance Radar - Model 4 (ARSR-4) is a three-dimensional, long-range, rotating phased array, primary surveillance radar with integrated height finder capability. It is part of the joint surveillance system (JSS) used in conjunction with ARSR-3 coverage as part of the nationwide air defense command surveillance network. In addition to functions peculiar to the military, the ARSR-4 performs the same basic functions of the ARSR-3, by providing primary long-range surveillance data, including slant range and azimuth data.

Air Traffic Control Beacon Interrogator - Model 4 (key system)

The Air Traffic Control Beacon Interrogator - Model 4 (ATCBI-4) is an air traffic control (ATC) beacon system that interrogates transponder-equipped aircraft. It is a secondary radar system that interrogates transponders, receives aircraft identification, and determines position data.

Air Traffic Control Beacon Interrogator - Model 5 (key system)

The Air Traffic Control Beacon Interrogator - Model 5 (ATCBI-5) is an air traffic control (ATC) beacon system that interrogates transponder-equipped aircraft. It is a secondary radar system that interrogates transponders, receives aircraft identification, and determines position data.

Air Traffic Control Beacon Interrogator - Model 6 (key system)

The Air Traffic Control Beacon Interrogator Model 6 (ATCBI-6) is a ground-based system that interrogates transponders, receives and processes replies from transponders, determines the range and azimuth to the aircraft, and forwards the information to appropriate air traffic control (ATC) automation systems. Replies provide identification and altitude data of the transponder.

Airport Movement Area Safety System (key system)

The Airport Movement Area Safety System (AMASS) with Airport Surface Detection Equipment (ASDE) provides controllers with automatically generated visual and aural alerts of potential runway incursions and other potential unsafe conditions. AMASS includes the Terminal Automation Interface Unit (TAIU) that processes arrival data from the airport surveillance radar. AMASS adds an automation enhancement to the ASDE-3 and tracks the movement of aircraft and ground vehicles on the airport surface and presents the data to the tower controllers via the ASDE display.

Airport Surface Detection Equipment - Model 3 (key system)

Airport Surface Detection Equipment - Model 3 (ASDE-3) provides primary radar surveillance of aircraft and airport service vehicles on the surface movement area. ASDE-3 is installed at the busiest U.S. airports. Radar monitoring of airport surface operations (ground movements of aircraft and other supporting vehicles) provides an effective means of directing and moving surface traffic. This is especially important during periods of low visibility such as rain, fog, and night operations.

The ASDE-3 will undergo a SLEP to extend its service life through 2015 (see ASDE-3 SLEP), which will enable it to more effectively support AMASS (see) through this same time period.

Airport Surface Detection Equipment - Model 3 Service Life Extension Program (key system)

Airport Surface Detection Equipment - Model 3 Service Life Extension Program (ASDE-3 SLEP) provides for the technical refresh of the ASDE-3. The following components will be replaced or upgraded: antenna azimuth encoders, transmitter power supply modulators, digital processing circuit cards, display units, and other obsolete parts. The SLEP will extend the life of the ASDE-3 through 2015, which will allow it to support AMASS more effectively.

Future tech refreshes of the ASDE-3 will be included as part of the ASDE-3/AMASS Upgrade activity.

Airport Surveillance Radar - Model 11 (key system)

The Airport Surveillance Radar- Model 11 (ASR-11) is a digital, combined primary and secondary surveillance radar (SSR), short-range radar system with a 60 nautical mile (nmi) detection range for medium and small activity airports. The ASR-11 provides advanced digital primary radar including weather intensity surveillance with an integrated monopulse SSR system for use in the airport terminal area. The ASR-11 is used to detect and report the presence and location of an aircraft in a specific volume of airspace. The ASR-11 provides search radar surveillance coverage in controlled airspace primarily in terminal areas.

Airport Surveillance Radar - Model 7 (key system)

The Airport Surveillance Radar - Model 7 (ASR-7) is a short-range (60 nm) analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the Air Traffic Control Beacon Interrogator - Model 4 or Model 5 (ATCBI-4 or ATCBI-5) or Mode S. This system will be replaced by the ASR-11.

Airport Surveillance Radar - Model 8 (key system)

The Airport Surveillance Radar - Model 8 (ASR-8) is a short-range (60 nm), analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the Air Traffic Control Beacon Interrogator - Model 4 or Model 5 (ATCBI-4 or ATCBI-5) or Mode S.

Airport Surveillance Radar - Model 9 (key system)

The Airport Surveillance Radar - Model 9 (ASR-9) is a short range (60 nm) radar system for the airport terminal area. The ASR-9 processes the returns from aircraft targets, which includes demodulation, analog-to-digital conversion, range and azimuth gating, sensitivity timing control, and a moving target detection function. The moving target detector includes two-level weather contour processing, digital signal processing, correlation and interpolation processing, and surveillance processing. The ASR-9 has a separate weather channel with associated processing capable of providing six-level weather contours. The two-level weather contour processing associated with the moving target detector is only be used for backup. The six-level weather channel is primarily used to supplement Next Generation Weather Radar (NEXRAD) coverage. It is normally used in conjunction with Mode Select (Mode S) but it can accommodate an Air Traffic Control Beacon Interrogator Model 4/5 (ATCBI-4/5).

The ASR-9 will be upgraded/replaced with the ASR-9/Mode S SLEP (see separate mechanism) in the 2007-12 time frame.

Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) (key system)

The Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) (ASR-9/Mode S (SLEP)) mechanism provide the necessary technical refresh to extend the service life of the ASR-9 and Mode S through 2030. The ASTERIX upgrade has not been implemented, but will be implemented at a later date.

Automated Radar Terminal System - Model IIE (key system)

The Automated Radar Terminal System - Model IIE (ARTS IIE) provides radar data processing (RDP) and decision support tools to the controller in the terminal environment. Utilized at low to medium-size Terminal Radar Control (TRACONs) Facilities the ARTS IIE is capable of receiving input from up to 2 sensors, can process up to 256 tracks simultaneously, and support up to 22 displays. The ARTS IIE implements the Common ARTS software for improved performance maintenance efficiency. The radar data processing (RDP) software provides automated surveillance tracking and display processing. Included in the ARTS IIE software are decision support tools such as Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Mode C intruder alert, Converging Runway Display Aid (CRDA), and Controller Automation Spacing Aid (CASA).

Automated Radar Terminal System - Model IIIA (key system)

The Automated Radar Terminal System - Model IIIA (ARTS IIIA) provides radar data processing (RDP) and decision support tools to the controller in the terminal environment. Utilized at larger airports, ARTS IIIA is capable of receiving input from up to three sensors, can process up to 900 tracks simultaneously and support up to 36 displays. The RDP software provides automated surveillance tracking and display processing. Included in the ARTS IIIA software are decision support tools such as Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Mode C intruder alert, Converging Runway Display Aid (CRDA), Final Monitor Aid (FMA), and controller automation spacing aid.

Automated Radar Terminal System - Model IIIE (key system)

The Automated Radar Terminal System - Model IIIE (ARTS IIIE) consists of the hardware platform and software required providing radar data processing (RDP) and decision support tools to the controller in the terminal environment. The ARTS IIIE is used at consolidated Terminal Radar Approach Control (TRACON) facilities. The Common ARTS program provided an ARTS IIIE capable of receiving input from up to 15 sensors, the ability to process up to 10,000 tracks simultaneously, and support up to 223 displays. The RDP software provides automated surveillance tracking and display processing including mosaic display of radar data. Included in the ARTS IIIE software are decision support tools such as Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Mode C intruder alert, Converging Runway Display Aid (CRDA), Final Monitor Aid (FMA), and controller automation spacing aid.

Automated Radar Terminal System Software Modification (All Purpose Structured Eurocontrol Information Exchange, etc,) (key system)

Automated Radar Terminal System Software Modification (All Purpose Structured Eurocontrol Information Exchange (ASTERIX), etc,), (ARTS S/W Mod (ASTERIX, etc)). Modification to the ARTS software that will add capabilities including weather product integration on the displays, processing of ASTERIX formatted surveillance data, improved traffic management and surveillance data processing, Ground-Initiated Communications Broadcast (GICB), and terminal data link functionality.

Beacon Interrogator, Military (key system)

The UPX-39 is a new secondary surveillance radar beacon system that will replace the OX-60 secondary (beacon) radars in Alaska (12) and Hawaii (1) at the 13 joint-use (FPS-117 primary radar) facilities to improve the quality, reliability, and availability of radar data used for air traffic control and to reduce FAA and United States Air Force maintenance costs. The FAA will use existing interfaces to provide the radar data to the ARTCCs. The FAA provides technical support and funds its share of the cost associated with the fabrication, installation, and acceptance of 13 systems at the joint-use radar facilities.

Beacon Interrogator, Military (key system)

The OX-60 is a secondary (beacon) system collocated with the 12 joint-use FPS-117 long-range primary radars in Alaska and 1 joint-use FPS-117 in Hawaii. It is used to interrogate transponder-equipped aircraft, receive aircraft identification, determine aircraft position, and forward the information to appropriate U.S. Department of Defense and FAA air traffic control automation systems.

Digital Airport Surveillance Radar (key system)

The Digital Airport Surveillance Radar (DASR) provides advanced digital primary radar including weather intensity surveillance with an integrated mono-pulse Secondary Surveillance Radar (SSR) system for use in the airport terminal area. (Military version of ASR-11)

Digital Bright Radar Indicator Tower Equipment (key system)

The Digital Bright Radar Indicator Tower Equipment (DBRITE) is a tower display system that provides a raster scan presentation of radar/beacon videos and automation system alphanumeric data. The system accepts radar, beacon, external map, analog data, and automation system data.

Digital Voice Recorder System

Provides modern digital voice recording devices used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

In Feburary 2004, the DVRS was upgraded with a 24-channel card, which replaced the 16-channel card. This minor upgrade, called DVR II, was not extended to the systems installed prior to February 2004.

Display System Replacement (key system)

The Display System Replacement (DSR) provides continuous real-time, automated support to air traffic controllers for the display of surveillance, flight data and other critical control information. This information is processed by the Host and Oceanic Computer System Replacement (HOCSR) and the Enhanced Direct Access Radar Channel (EDARC) subsystems. The DSR provides controller workstations, displays, and input/output devices and a communications infrastructure to connect the DSR with external processing elements of the en route ATC automation system.

Enhanced Terminal Voice Switch (key system)

The Enhanced Terminal Voice Switches (ETVS) are installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) facilities with more than four air traffic controller positions. The ETVS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The ETVS (installed in the ATCT) provides the ATC operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the ETVS.

The ETVS (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within a TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the ETVS.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate ETVS systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Final Monitor Aid (key system)

The Final Monitor Aid (FMA) provides controllers the ability to control multiple simultaneous approaches to parallel runways under instrument flight rule (IFR) conditions by providing increased definition for maintaining aircraft separation. The FMA is installed at the Denver International Airport. The FMA system extracts data from the Automated Radar Terminal System (ARTS) and processes this data for display on the FMA displays.

Fixed Position Surveillance - Model 117 (key system)

The Fixed Position Surveillance - Model 117 (FPS-117) radar is a joint-use military surveillance system used by the FAA to detect slant range and azimuth of en route aircraft. These radars are located in Alaska (12) and Hawaii (1), and are expected to be sustained until at least 2020.

Fixed Position Surveillance Model 20 Series (key system)

The Fixed Position Surveillance Model 20 Series (FPS-20 Series) is a military primary radar of various models (FPS-20A, FPS-64, FPS-66A, FPS-67/A/B, and ARSR-60M) used by the FAA to detect slant range and azimuth of en route aircraft operating between terminals in the continental United States. Each of the different radar models is a similar variation of the original FPS-20 military radar.

Flight Data Input/Output (key system)

The Flight Data Input/Output (FDIO) system provides flight progress information for use by the Tower, Terminal Radar Approach Control (TRACON) and Air Route Traffic Control Center (ARTCC) controllers. The FDIO system allows Air Traffic Control (ATC) Specialists to input automated flight data, perform data manipulation, and print flight strips.

Flight Data Input/Output Modification (Technical Refresh) (key system)

The Flight Data Input/Output Modification (Technical Refresh) (FDIO Mod (Tech Refresh)) mechanism replaces components that are uneconomical to maintain in the system providing an interface between the air traffic controller (terminal or en route) and the center computer. FDIO provides flight plan data in printed form for Airport Traffic Control Tower (ATCT) and Terminal Radar Approach Control (TRACON) controllers.

Full Digital Automated Radar Terminal System Display (key system)

Full Digital ARTS Display (FDAD) is the fully digital ARTS display system that provides the display and data input devices for terminal controllers using ARTS IIIE and ARTS IIIA. The FDAD can work in analog video time share mode or full digital mode. The present application is analog video time share mode.

High Frequency Airborne Radios

High Frequency (HF) Airborne Radios are analog (HF multi-channel radio transceivers operating in the 2 - 30 Mhz frequency band installed in airborne commercial, cargo, and military aircraft transiting the oceanic, en route, terminal, or flight service station airspace domains. These transceivers are typically used in transoceanic applications.

High Frequency Ground Radios (key system)

High Frequency (HF) Ground Radios are analog HF radio devices operating in the 2 - 30 Mhz frequency band, which may be single channel transmitters and receivers or multi-channel transceivers. These radio devices are installed at oceanic and en route facilities and used to support tactical air traffic control (ATC) voice communications between a ground controller and a pilot in an aircraft in the oceanic domain. Additionally, these devices are also installed at regional facilities and used to support voice command and control communications /coordination in emergency or during disaster recovery situations occurring in the NAS.

Host Computer System (key system)

The Host Computer System (HCS) receives and processes surveillance reports, and flight plan information. The HCS sends search/beacon target, track and flight data, surveillance and alphanumeric weather information, time data, traffic management advisories and lists to the (Display System Replacement) DSR. The HCS associates surveillance-derived tracking information with flight-planning information. The DSR sends requests for flight data, flight data updates, and track control messages to the HCS. HCS-generated display orders are translated for use within the DSR workstation. While radar data processing is distributed among the terminal and En Route computer resources, the HCS performs virtually all of the flight data processing for its entire geographical area of responsibility. Every tower (ATCT) and terminal radar approach control (TRACON) relies exclusively on its parent HCS for flight data.

The HCS also runs algorithms that perform aircraft to aircraft (conflict alert) and aircraft to terrain (Minimum Safe Altitude Warning) separation assurance. The HCS algorithms provide visual and audible alerting to the controller when conflicts are identified.

The HCS presently supplies real time surveillance, flight data and other information to several decision support tools housed in collocated outboard processors connected via two-way high bandwidth links to the HCS and DSR. These are the (User Request Evaluation Tool, (URET), and the Traffic Management Advisory (TMA. URET performs probing of tentative flight plan changes to determine their viability. TMA provides sequencing and spacing information to align the aircraft in En Route airspace for approach.

Integrated Communications Switching System Type I (key system)

The Integrated Communications Switching System Type I (ICSS I) are installed at Airport Traffic Control Towers (ATCT), Terminal Radar Approach Control (TRACON) facilities, and Automated Flight Service Stations (AFSS).

The ICSS I (installed in the ATCT) provides the air traffic control (ATC) operational ground-ground voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/air traffic control system command center (ATCSCC) specialists. Ground-air radio connectivity between ATCT controllers and pilots is also supported by the ICSS I.

The ICSS I (installed in the TRACON) provides the ATC operational ground-ground voice communications interconnectivity between controllers within TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Ground-air radio connectivity between TRACON controllers and pilots is also supported by the ICSS I.

The ICSS I (installed in the AFSS) provides the ATC operational ground-ground voice communications interconnectivity between specialists within an AFSS (intercom), interconnectivity between specialists in separate AFSSs (interphone), and interconnectivity between Flight Service Station (FSS) specialists and Air Route Traffic Control Center (ARTCC) controllers/TRACON controllers/ATCT controllers/Air Traffic Control System Command Center (ATCSCC) specialists. Ground-air radio connectivity between AFSS specialists and pilots is also supported by the ICSS I.

Integrated Communications Switching System Type III (key system)

The Integrated Communications Switching System Type III (ICSS III) is installed at Automated Flight Service Stations (AFSS). The ICSS III (installed in the AFSS) provides the air traffic control (ATC) operational ground-to-ground (G/G)voice communications interconnectivity between specialists within an AFSS (intercom), interconnectivity between specialists in separate AFSSs (interphone), and interconnectivity between Flight Service Station (FSS) specialists and Air Route Traffic Control Center (ARTCC) controllers/Terminal Radar Approach Control (TRACON) controllers/ATCT controllers/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between AFSS specialists and pilots is also supported by the ICSS III.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS II systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Light Gun

A light gun (light gun) provides direct visual signals to pilots in aircraft and drivers of vehicles on the airport surface. The light gun provides an alternate means of communications. It is used when voice communications fails and there is direct line of sight to the aircraft or vehicle. It is sometimes used in conjunction with voice communications.

Microprocessor-En Route Automated Radar Tracking System (key system)

The Microprocessor-En Route Automated Radar Tracking System (Micro-EARTS) is a radar processing system implemented with Commercial Off-the-Shelf (COTS) equipment, for use in both En Route and Terminal environments. It provides single sensor and a mosaic display of traffic and weather using long- and short-range radars. At Anchorage, Alaska, Micro-EARTS also provides Automatic Dependent Surveillance-Broadcast (ADS-B) surveillance and display. Micro-EARTS interfaces with multiple types of displays, including Display System Replacement (DSR), Digital Bright Radar Indicator Tower Equipment (DBRITE), and the flat panel tower controller displays.

Mode Select (key system)

The Mode Select (Mode S) mechanism is a ground-based system capable of selective interrogation of Mode S transponders and general interrogation of Air Traffic Control Radar Beacon System (ATCRBS) transponders within range. The system also receives, processes, and forwards the transponder replies to appropriate air traffic control (ATC) automation systems. Data formats for both interrogation and reply include data exchange capability.

The system also provides a Traffic Information Services (TIS) function that makes local traffic data available to the flight deck via the Mode S data link. TIS, a Mode S data link service, provides automatic traffic advisories to properly equipped aircraft. Pilots are able to request and receive a display of nearby traffic. The relative range, bearing, and altitude (if known) and a "proximate" or "threat" classification of nearby aircraft will be displayed in the cockpit.

Mode Select Transponder (key system)

The Mode Select Transponder (Mode S Transponder) is an avionics system that responds to 1,030 MHz interrogations from ground-based sensors or Traffic Alert and Collision Avoidance System (TCAS) airborne avionics with 1,090 MHz replies containing aircraft identification, altitude, and other selected data. Mode S transponders offer improvements over conventional Air Traffic Control Radar Beacon System (ATCRBS) transponders in that they provide over 16 million unique beacon codes, can be selectively interrogated to prevent overlapping or garbling of replies from proximate aircraft, and can provide a high-capacity air-ground data link. In addition to responding to "all call" or "roll call" interrogations from ground-based sensors or TCAS avionics, the Mode S transponders are required to transmit or squitter their 24-bit unique identity and altitude once per second. These squitters are "voluntary" or automatic and not in response to any interrogation. The squitters allow TCAS avionics in proximate aircraft or other systems to acquire Mode S equipped aircraft by only listening on 1,090 MHz.

Next-Generation Air/Ground Communications System Cockpit Display Unit (key system)

The Next-Generation Air/Ground Communications System Cockpit Display Unit (NEXCOM CDU) displays NEXCOM messages in aircraft cockpit. This display may be a standalone device or may be part of a multifunction, switchable, display unit.

Next-Generation Air/Ground Communications System Communication Management Unit (key system)

The Next-Generation Air-Ground Communications System Communication Management Unit (NEXCOM CMU) is a device that routes data to and from the NEXCOM radios, and incoming data to the appropriate cockpit display. This may be a standalone unit, part of a multifunctional display (MFD) or it may be implemented as part of a Flight Management System (FMS).

Peripheral Adapter Module Replacement Item (key system)

The Peripheral Adapter Module Replacement Item (PAMRI) is an interface peripheral to the HOCSR. It provides a conduit through which the HOCSR receives and exchanges data, primarily radar data, flight data and interfacility data. The PAMRI converts communication protocols and translates data formats so the Host and EDARC can communicate with external devices.

Power Systems

The Power Systems (Pwr Sys) mechanism provides for the conditioning of commercial power, including uninterruptible power systems (UPS), to eliminate voltage dropouts, surges, and voltage sags caused by sources outside the facility. Power distribution, grounding, bonding and shielding of electrical system within the facility is also part of the Pwr Sys.

The Power Systems (Pwr Sys) mechanism provides the following: 1.) ACEPS Busway Replacements, 2.) ACEPS EG Maintenance, 3.) ACEPS Monitoring & Diagnostics, 4.) ACEPS Fuel System Upgrade, 5.) ACEPS Training, 6.) Battery Monitoring, 7.) Training Facility, 8.) CPDS, 9.) Battery Replacements, 10.) DC Systems, 11.) EG, 12.) LPGBS, 13.) Power Cable, 14.) UPS, 15.) Contract Support.

Precision Runway Monitor (key system)

The Precision Runway Monitor (PRM) is a secondary radar system, similar to the Mode Select (Mode S), which operates and updates targets at a faster rate than that of the normal Air Traffic Control Radar Beacon System (ATCRBS) or Mode S system. This faster update rate provides improved precision in predicting target positions. The PRM system is utilized to increase efficiency of operations during instrument meteorological conditions (IMC) by allowing independent simultaneous approaches to parallel runways spaced less than 4,300-feet apart. A separate display is located in the TRACON to support these parallel runway operations.

The PRM sensor (secondary radar) will undergo a Service Life Extension at the end of its current service life. The display function will eventually be incorporated into STARS.

Radar Automated Display System (key system)

The Radar Automated Display System (RADS) is the Air Traffic Controller workstation for the Automated Radar Terminal System Model IIE (ARTS IIE).

Rapid Deployment Voice Switch Type I (key system)

The Rapid Deployment Voice Switch Type I (RDVS I) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS I (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the RDVS I. The RDVS I (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the RDVS I.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS I systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Rapid Deployment Voice Switch Type II (key system)

The Rapid Deployment Voice Switch Type II (RDVS II) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS II (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the RDVS II. The RDVS II (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the RDVS II.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS II systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Rapid Deployment Voice Switch Type IIA (key system)

The Rapid Deployment Voice Switch Type IIA (RDVS IIA) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS IIA (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. The RDVS IIA also supports air-to-ground (A/G) radio connectivity between ATCT controllers and pilots. The RDVS IIA (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between TRACON controllers and pilots is also supported by the RDVS IIA.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS IIA systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Remote Maintenance Monitoring Subsystem (key system)

Hardware and software components comprising a subsystem of the NAS infrastructure management system. RMMS monitors system performance to detect alarm or alert conditions and transmits appropriate messages to the maintenance processor system/subsystem (MPS). RMMS initiates diagnostics tests and adjusts/changes system parameters or configurations when properly commanded. There are approximately 5,000 RMMS in service.

Satellite Communication Airborne Radios

The Satellite Communication (SATCOM) airborne radios are transceivers installed in commercial, cargo, and military aircraft transiting in the National Airspace System (NAS) and are used as an alternate means of voice communications between pilots in aircraft and ground controllers. These transceivers are typically used in transoceanic applications.

Satellite Communication Ground Radios

Satellite Communications (SATCOM) Ground Radios are transceivers installed at oceanic and en route facilities to support an alternative means of tactical air traffic control (ATC) voice communications between ground controllers and pilots in aircraft. These transceivers are typically used in transoceanic applications. These transceivers are also installed at regional facilities and used as an alternate means of communications in case of total ground communications failure or between locations in mountainous terrain or where other means of communications are not possible (e.g., Alaska).

Oceanic air to ground satellite communications are provided via a communications service provider. The FAA currently has no plans to develop or implement its own air to ground SATCOM ground radios.

Satellite Telecommunications Data Link

Oceanic Centers use Satellite Telecommunications Data Link (SATCOM DL) mechanism transfer data between ground stations and aircraft. The FAA contracts for the satellite communications services and uses FANS-1A applications in the Oceanic automation system.

The FAA has no plans to develop its own SATCOM air to ground communications system.

Standard Terminal Automation Replacement System (key system)

The Standard Terminal Automation Replacement System (STARS) processes primary and secondary radar information to acquire and track data points to display aircraft position for controllers. STARS provides safety tools such as, conflict alert (CA), Mode C intruder (MCI), final monitoring aid (FMA), Minimum Safe Altitude Warning (MSAW), Converging Runway Display Aid (CARDA), and Controller Automated Spacing Aid (CASA). Also, STARS provides the capability to implement the following enhancements: improved radar processing, Global Positioning System (GPS) compatibility, adaptive routing, Center Terminal Radar Approach Control (TRACON) Automation System (CTAS), data link implementation, improved weather display, and better utilization of traffic management information.

Standard Terminal Automation Replacement System Terminal Controller Workstation (key system)

The Standard Terminal Automation Replacement System Terminal Controller Workstation (STARS TCW) provides the interface between the Terminal Radar Approach Control (TRACON) controller and the STARS processing unit.

Traffic Alert and Collision Avoidance System (key system)

A Traffic Alert and Collision Avoidance System (TCAS) broadcasts interrogations and receives responses from Air Traffic Control Radar Beacon System (ATCRBS) Mode A/C and Mode Select (Mode S) transponders within range. TCAS processes these responses to provide warnings, advisories and visual proximity information to the flight crew via a cockpit display.

Traffic Information System Avionics (key system)

Traffic Information System Avionics (TIS Avionics) receive signals from Mode Select ground-based beacon interrogators that contain position information on all aircraft responding to its interrogations and provides relative position of aircraft in the immediate vicinity to the flight crew displays.

Ultra High Frequency Airborne Radios (key system)

The Ultra High Frequency Avionics (UHF Avionics) are analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225-400 MHz frequency band, which are multi-channel transceivers, installed in an airborne military platform. These airborne devices support the tactical two-way voice communications/ coordination between the military pilot in the military aircraft and the controller on the ground.

Ultra High Frequency Ground Radios (key system)

Ultra High Frequency (UHF) Ground Radios are analog UHF amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 Mhz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and flight service station domains.

User Request Evaluation Tool National Deployment

The User Request Evaluation Tool National Deployment (URET National Deployment) provides conflict probe capabilities to the data controller display in the Air Route Traffic Control Centers (ARTCC) facilities. URET combines real-time flight plan and radar track data with site adaptation, aircraft performance characteristics, and winds and temperatures aloft to construct four dimensional flight profiles, or trajectories, for pre-departure and active flights. For active flights, it also adapts itself to the observed behavior of the aircraft, dynamically adjusting predicted speeds, climb rates, and descent rates based on the performance of each individual flight as it is tracked through en route airspace, all to maintain aircraft trajectories to get the best possible prediction of future aircraft positions. URET uses its predicted trajectories to continuously detect potential aircraft conflicts up to 20 minutes into the future and to provide strategic notification to the appropriate sector. URET enables controllers to "look ahead" for potential conflicts through "what if" trial planning of possible flight path amendments. It enables controllers to accommodate user-preferred, off-airway routing to enable aircraft to fly more efficient routes, which reduce time and fuel consumption.

The National Deployment deployment of URET adds systems to the remaining ARTCCs and tech refreshes the original systems fielded under URET CCLD. The tech refresh provides additional functionalities. It will also introduce infrastructure changes to synchronize with DSR D-side infrastructure changes (see the DSR Mod (Tech Refresh) mechanism), both of which are driven by future ERAM infrastructure changes. New URET functions include: Alternate Flight Plan Processing; Automatic Assistance Dynamic Rerouting; ICAO flight plan processing; Problem Analysis, Resolution and Ranking; Airspace Redesign; and Tech Refresh. ERAM will replace the URET Fiber Distributed Data Interface (FDDI) LAN infrastructure, the URET Conflict Probe processor, and add a redundant Conflict Probe backup capability.

Very High Frequency / Ultra High Frequency Emergency Communications Transceivers - Terminal (key system)

Very High Frequency / Ultra High Frequency Emergency Communications Transceivers - Terminal (VHF/UHF ECT - Terminal) are analog VHF and UHF transceivers operating in either the 118 - 137 Mhz or 225 - 400 Mhz frequency bands. These transceivers are used in the terminal domain as emergency communications.

Very High Frequency Airborne Radios (key system)

Very High Frequency (VHF) Airborne Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 Mhz frequency band which are multi-channel transceivers installed in an airborne platform (e.g., commercial, cargo, and general aviation aircraft). These airborne devices support the tactical two-way voice communications/coordination between the pilot in the aircraft and the controller on the ground.

Very High Frequency Ground Radios (key system)

Very High Frequency (VHF) Ground Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 MHz frequency band which are single-channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the pilot in commercial, cargo, or general aviation aircraft in the oceanic, en route (i.e., ARTCC), terminal (i.e., TRACON/tower), and flight service station domains. Additionally, there are analog VHF frequency modulation (VHF - FM) radio devices operating in the 161 - 174 MHz frequency band that are multi-channel transceivers. These transceivers are used by flight inspection, aviation security, and airway facility specialists supporting local airport operations and maintenance or to perform their operational maintenance mission in support of the NAS. However, these same VHF-FM transceivers are also used to support the resolution of emergency situations or establish a level of voice command and control communications/coordination during disaster recovery.

Very High Frequency Mobile Radios (key system)

Very High Frequency (VHF) Mobile Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 Mhz frequency band which are multi-channel transceivers installed in surface vehicles (e.g., "follow-me," maintenance, administrative, and snow-removal vehicles). These devices support the tactical two-way voice communications/coordination between the operators in the vehicles and the tower controllers or airline operations personnel.

Very High Frequency Multi-Mode Airborne Radios (key system)

Very High Frequency Multi-Mode Airborne Radios (VHF MM Airborne Radios) refers to an airborne radio operating in the very high frequency (VHF) range capable of operating in the following modes: (1)) analog voice (i.e., 25 kHz spacing for use in the United States and other similarly equipped countries); (2) VHF Digital Link Mode 2 (VDL Mode-2) (two-way digital data transmission); (3) VHF Digital Link Mode 3 (VDL Mode-3), (integrated two-way digital voice/data transmission); and (4) analog voice (i.e., 8.33 kHz spacing for use in Europe and other similarly equipped countries).

Voice Switching and Control System (key system)

The Voice Switching and Control System (VSCS) is installed in the Air Route Traffic Control Center (ARTCC). The VSCS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The VSCS provides the Air Traffic Control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ARTCC (intercom), interconnectivity between controllers in separate ARTCCs (interphone), and interconnectivity between ARTCC controllers and Terminal Radar Approach Control (TRACON) controllers/Airport Traffic Control Tower (ATCT) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ARTCC controllers and pilots is also supported by the VSCS.

Voice Switching and Control System Training and Backup Switches

Voice Switching and Control System Training and Backup Switch (VTABS) was developed to meet AT requirements for a separate standalone VSCS Backup and Training System. VTABS can be configured as a 50-position switch with the capability to support air traffic operations in the event of VSCS failure, hardware and software maintenance or power loss.

People

Airline Operations Center Dispatcher

The Airline Operations Center Dispatcher (AOC Dispatcher) is a major airline employee that enters bulk flight plan requests and works with FAA by revising schedules and providing flight cancellations based on FAA provided data (aggregate demand lists, arrival rates, and parameters for anticipated ground delays.)

Ground Controller

A Ground Controller performs the following activities: Ensure separation; Control vehicles as well as aircraft on movement areas other than active runways Initiate control instructions; Monitor and operate communications equipment; Utilize tower radar display(s); Utilize alphanumerics; Assist the tower associate controller with coordination; Scan tower cab environment; Ensure computer entries and strip marking are completed for instructions or clearances issued or received; Process and forward flight plan information; Perform any functions of the tower team which will assist in meeting situation objectives; Coordinate with local control for safe and efficient use of runways and movement areas.

Local Controller

A Local Controller performs the following activities: Ensure separation; Control active runways; Initiate control instructions; Monitor and operate communications equipment; Utilize tower radar display(s); Utilize alphanumerics; Assist the tower associate controller with coordination; Scan tower cab environment; Ensure computer entries and strip marking are completed for instructions or clearances issued or received; Process and forward flight plan information; Perform any functions of the tower team which will assist in meeting situation objectives; Coordinate with ground control for safe and efficient use of runways and movement areas.

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Radar Controller

A Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate automated handoffs; Assist the radar associate controller with non-automated handoff actions when needed; Assist the radar associate controller in coordination when needed; Scan radar display; Correlate with flight progress strip information; Ensure computer entries are completed on instructions or clearances you issue or receive; Ensure strip marking is completed on instructions or clearances you issue or receive.

Interfaces

Air Route Surveillance Radar - Model 1E — (Surveillance Data) → Air Traffic Control Beacon Interrogator - Model 6

The ATCBI-6 correlates return signals from the primary radar with beacon signals and transmits the data to the automation system.

Air Route Surveillance Radar - Model 1E — (Surveillance Data) → Mode Select

The MODE S system correlates the primary radar returns with beacon data and transmits them to the automation system for tracking and display.

Air Route Surveillance Radar - Model 1E — (Surveillance Data) → Peripheral Adapter Module Replacement Item

The ARSR-1 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the PAMRI interface, which then routes the data to the HCS and DARC for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 1E — (Weather Data) → Peripheral Adapter Module Replacement Item

The ARSR-1E long-range radar provides detected weather data to the PAMRI for processing at en route facilities.

Air Route Surveillance Radar - Model 2 — (Surveillance Data) → Air Traffic Control Beacon Interrogator - Model 6

The ATCBI-6 correlates return signals from the primary radar with beacon signals and transmits the data to the automation system.

Air Route Surveillance Radar - Model 2 — (Surveillance Data) → Mode Select

The MODE S system correlates the primary radar returns with beacon data and transmits them to the automation system for tracking and display.

Air Route Surveillance Radar - Model 2 — (Surveillance Data) → Peripheral Adapter Module Replacement Item

The ARSR-2 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the PAMRI interface, which then routes the data to the HCS and DARC for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 2 — (Weather Data) → Peripheral Adapter Module Replacement Item

The ARSR-2 long-range radar provides detected weather data to the PAMRI for processing at en route facilities.

Air Route Surveillance Radar - Model 3 — (Surveillance Data) → Air Traffic Control Beacon Interrogator - Model 6

The ATCBI-6 correlates return signals from the primary radar with the beacon signals and transmits the data to the automation system for tracking and display.

Air Route Surveillance Radar - Model 3 — (Surveillance Data) → Microprocessor-En Route Automated Radar Tracking System

The ARSR-3 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the Micro-EARTS for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 3 — (Surveillance Data) → Peripheral Adapter Module Replacement Item

The ARSR-3 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the PAMRI interface, which then routes the data to the HCS and DARC for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 3 — (Weather Data) → Peripheral Adapter Module Replacement Item

The ARSR-3 long-range radar provides detected weather data to the PAMRI for processing at en route facilities.

Air Route Surveillance Radar - Model 4 — (Surveillance Data) → Air Traffic Control Beacon Interrogator - Model 6

The ATCBI-6 correlates return signals from the primary radar with the beacon signals and transmits the data to the automation system for tracking and display.

Air Route Surveillance Radar - Model 4 — (Surveillance Data) → Automated Radar Terminal System - Model IIE

The ARSR-4 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.

Air Route Surveillance Radar - Model 4 — (Weather Data) → Automated Radar Terminal System - Model IIE

The ARSR-4 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIE for processing and use in controlling air traffic in the CERAP domain (Guam).

Air Route Surveillance Radar - Model 4 — (Surveillance Data) → Microprocessor-En Route Automated Radar Tracking System

The ARSR-4 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the Micro-EARTS for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 4 — (Weather Data) → Microprocessor-En Route Automated Radar Tracking System

The ARSR-4 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the

Micro-EARTS for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 4 — (Surveillance Data) ➔ Peripheral Adapter Module Replacement Item

The ARSR-4 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the PAMRI interface, which then routes the data to the HCS and DARC for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 4 — (Weather Data) ➔ Peripheral Adapter Module Replacement Item

The ARSR-4 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the PAMRI for processing and use in controlling air traffic in the en route domain.

Air Traffic Control Beacon Interrogator - Model 4 — (Surveillance Data) ➔ Air Route Surveillance Radar - Model 1E

The ARSR-1 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports via a CD-2, which sends the data to an automation system for tracking and display.

Air Traffic Control Beacon Interrogator - Model 4 — (Surveillance Data) ➔ Air Route Surveillance Radar - Model 2

The ARSR-2 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports via a CD-2, which sends the data to an automation system for tracking and display.

Air Traffic Control Beacon Interrogator - Model 4 — (Surveillance Data) ➔ Airport Surveillance Radar - Model 9

The ASR-9 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports and then sends the data to an automation system for tracking and display.

Air Traffic Control Beacon Interrogator - Model 4 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIE

The ATCBI-4 sends aircraft identification, position, and altitude to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.

Air Traffic Control Beacon Interrogator - Model 4 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIE

The ATCBI-4 sends aircraft identification, position, and altitude to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.

Air Traffic Control Beacon Interrogator - Model 4 — (Surveillance Data) ➔ Fixed Position Surveillance Model 20 Series

The FPS radar correlates beacon reports from the collocated secondary surveillance radar with its search radar reports via a CD-2, which sends the data to an automation system for tracking and display.

Air Traffic Control Beacon Interrogator - Model 4 — (Surveillance Data) ➔ Microprocessor-En Route Automated Radar Tracking System

The ATCBI-4 sends aircraft identification, position, and altitude to the Micro-EARTS for processing and use in controlling air traffic in the terminal domain from a CERAP.

Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) ➔ Air Route Surveillance Radar - Model 1E

The ARSR-1 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports via a CD-2, which sends the data to an automation system for tracking and display.

Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) ➔ Air Route Surveillance Radar - Model 2

The ARSR-2 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports via a CD-2, which sends the data to an automation system for tracking and display.

Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) ➔ Air Route Surveillance Radar - Model 3

The ARSR-3 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports and then sends the data to an automation system for tracking and display.

Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) ➔ Air Route Surveillance Radar - Model 4

The ARSR-4 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports and then sends the data to an automation system for tracking and display.

Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) ➔ Airport Surveillance Radar - Model 9

The ASR-9 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports and then sends the data to an automation system for tracking and display.

Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIE

The ATCBI-5 sends aircraft identification, position, and altitude to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.

Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIA

The ATCBI-5 sends aircraft identification, position, and altitude to the ARTS IIIA for processing and use in controlling air traffic in the terminal domain.

Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIE

The ATCBI-5 sends aircraft identification, position, and altitude to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.

Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) ➔ Fixed Position Surveillance Model 20 Series

The FPS radar correlates beacon reports from the collocated secondary surveillance radar with its search radar reports via a CD-2, which sends the data to an automation system for tracking and display.

Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) ➔ Microprocessor-En Route Automated Radar Tracking System

The ATCBI-4 sends aircraft identification, position, and altitude to the Micro-EARTS for processing and use in controlling air traffic in the en route domain, as well as in terminal domains associated with CERAPs.

Air Traffic Control Beacon Interrogator - Model 6 — (Surveillance Data) ➔ Peripheral Adapter Module Replacement Item

The ATCBI-6 sends aircraft identification, position, and altitude to the PAMRI, which then routes to the HCS or DARC for processing and use in controlling air traffic in the en route domain.

Airport Surface Detection Equipment - Model 3 — (Surveillance Data) ➔ Airport Movement Area Safety System

The AMASS tracks the movement of aircraft and ground vehicles detected by the ASDE-3 surface radar and provides visual and aural alerts of potential runway incursions and unsafe conditions.

Airport Surface Detection Equipment - Model 3 Service Life Extension Program — (Surveillance Data) ➔ Airport Movement Area Safety System

The AMASS tracks the movement of aircraft and ground vehicles detected by the ASDE-3 surface radar and provides visual and aural alerts of potential runway incursions and unsafe conditions.

Airport Surveillance Radar - Model 11 — (Surveillance Data) ➔ Airport Movement Area Safety System

The AMASS system receives and processes the position, direction and speed of arriving aircraft from the airport surveillance radar to identify potential runway incursions and other unsafe conditions.

Airport Surveillance Radar - Model 11 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIE

The ASR-11 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIE for

processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 11 — (Weather Data) ➔ Automated Radar Terminal System - Model IIE
The ASR terminal radar provides detected weather data to the ARTS for processing.
Airport Surveillance Radar - Model 11 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIE
The ASR-11 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 11 — (Weather Data) ➔ Automated Radar Terminal System - Model IIIE
The ASR primary radar provides detected weather data to the ARTS for processing.
Airport Surveillance Radar - Model 11 — (Surveillance Data) ➔ Digital Bright Radar Indicator Tower Equipment
The ASR-11 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the DBRITE for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 11 — (Surveillance Data) ➔ Microprocessor-En Route Automated Radar Tracking System
The ASR-11 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the automation equipment interface, which then routes the data to the Micro EARTS for processing and use in controlling air traffic in the en route domain.
Airport Surveillance Radar - Model 11 — (Surveillance Data) ➔ Standard Terminal Automation Replacement System
The ASR-11 ground radar provides aircraft positional data (azimuth and slant range) to STARS for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 11 — (Weather Data) ➔ Standard Terminal Automation Replacement System
The ASR-11 provides weather radar data to the STARS application interface gateway for display on its TCW and TDW displays. The radar and local controller uses these data to indicate the precipitation levels present within the TRACON and airport.
Airport Surveillance Radar - Model 7 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIE
The ASR-7 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 7 — (Weather Data) ➔ Automated Radar Terminal System - Model IIE
The ASR-7 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 7 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIE
The ASR-7 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 7 — (Weather Data) ➔ Automated Radar Terminal System - Model IIIE
The ASR-7 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 7 — (Surveillance Data) ➔ Digital Bright Radar Indicator Tower Equipment
Raw radar return from the ASR-7 is routed to the DBRITE, which displays the position of the detected aircraft.
Airport Surveillance Radar - Model 7 — (Weather Data) ➔ Digital Bright Radar Indicator Tower Equipment
Raw radar return from the ASR-7 is routed to the DBRITE, which displays the detected weather.
Airport Surveillance Radar - Model 7 — (Surveillance Data) ➔ Microprocessor-En Route Automated Radar Tracking System
The ASR-7 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the Micro-EARTS for processing and use in controlling air traffic in the terminal domain from a CERAP.
Airport Surveillance Radar - Model 7 — (Surveillance Data) ➔ Mode Select
The MODE S system correlates the primary radar returns with beacon data and transmits them to the automation system for tracking and display.
Airport Surveillance Radar - Model 8 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIE
The ASR-8 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 8 — (Weather Data) ➔ Automated Radar Terminal System - Model IIE
The ASR-8 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIE use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 8 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIA
The ASR-8 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIA for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 8 — (Weather Data) ➔ Automated Radar Terminal System - Model IIIA
The ASR-8 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIIA for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 8 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIE
The ASR-8 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 8 — (Weather Data) ➔ Automated Radar Terminal System - Model IIIE
The ASR-8 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 8 — (Surveillance Data) ➔ Digital Bright Radar Indicator Tower Equipment
Raw radar return from the ASR-8 is routed to the DBRITE, which displays the position of the detected aircraft.
Airport Surveillance Radar - Model 8 — (Weather Data) ➔ Digital Bright Radar Indicator Tower Equipment
Raw radar return from the ASR-8 is routed to the DBRITE, which displays the detected weather.
Airport Surveillance Radar - Model 8 — (Surveillance Data) ➔ Microprocessor-En Route Automated Radar Tracking System
The ASR-8 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the Micro-EARTS for processing and use in controlling air traffic in the terminal domain from a CERAP.
Airport Surveillance Radar - Model 8 — (Surveillance Data) ➔ Mode Select
The MODE S system correlates the primary radar returns with beacon data via a Beacon Video Reconstitutor (BVR) and transmits them to the automation system for tracking and display.
Airport Surveillance Radar - Model 8 — (Surveillance Data) ➔ Peripheral Adapter Module Replacement Item
The ASR-8 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the PAMRI for processing

and use in controlling air traffic in the terminal domain from an ARTCC (for terminals with no TRACON).

Airport Surveillance Radar - Model 9 — (Surveillance Data) ➔ Airport Movement Area Safety System

The AMASS system receives and processes the position, direction and speed of arriving aircraft from the airport surveillance radar to identify potential runway incursions and other unsafe conditions.

Airport Surveillance Radar - Model 9 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIE

The ASR-9 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 9 — (Weather Data) ➔ Automated Radar Terminal System - Model IIE

The ASR terminal radar provides detected weather data to the ARTS for processing.

Airport Surveillance Radar - Model 9 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIA

The ASR-9 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIA for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 9 — (Weather Data) ➔ Automated Radar Terminal System - Model IIIA

The ASR terminal radar provides detected weather data to the ARTS for processing.

Airport Surveillance Radar - Model 9 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIE

The ASR-9 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 9 — (Weather Data) ➔ Automated Radar Terminal System - Model IIIE

The ASR primary radar provides detected weather data to the ARTS for processing.

Airport Surveillance Radar - Model 9 — (Surveillance Data) ➔ Digital Bright Radar Indicator Tower Equipment

Raw radar return from the ASR-9 is routed to the DBRITE, which displays the position of the detected aircraft.

Airport Surveillance Radar - Model 9 — (Weather Data) ➔ Digital Bright Radar Indicator Tower Equipment

Raw radar return from the ASR-9 is routed to the DBRITE, which displays the detected weather.

Airport Surveillance Radar - Model 9 — (Surveillance Data) ➔ Standard Terminal Automation Replacement System

The ASR-9 ground radar provides aircraft positional data (azimuth and slant range) to STARS for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 9 — (Weather Data) ➔ Standard Terminal Automation Replacement System

The ASR-9 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the STARS for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) — (Surveillance Data) ➔ Automated Radar Terminal System Software Modification (All Purpose Structured Eurocontrol Information Exchange, etc,)

The ASR-9 ground radar provides aircraft positional (azimuth and slant range) as well as time tag, identification, and intent data in ASTERIX format to the ARTS for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) — (Surveillance Data) ➔ Standard Terminal Automation Replacement System

The ASR-9 ground radar provides aircraft positional (azimuth and slant range) as well as time tag, identification, and intent data in ASTERIX format to STARS for processing and use in controlling air traffic in the terminal domain.

Automated Radar Terminal System - Model IIE — (Flight Data) ➔ Airport Movement Area Safety System

AMASS receives aircraft tag data from the Automated Radar Tracking System (ARTS) via the Terminal Automation Interface Unit (TAIU). AMASS then evaluates the data along with surveillance data received from airport surveillance radar to generate visual and aural alerts of potential runway incursions and other unsafe conditions.

Automated Radar Terminal System - Model IIE — (Track Data) ➔ Digital Bright Radar Indicator Tower Equipment

The ARTS sends terminal track data to the DBRITE for controllers use.

Automated Radar Terminal System - Model IIE — (Weather Data) ➔ Digital Bright Radar Indicator Tower Equipment

The ARTS sends terminal weather data to the DBRITE for controllers use.

Automated Radar Terminal System - Model IIE ⇐ (Track Data) ➔ Peripheral Adapter Module Replacement Item

The ARTS IIE provides terminal surveillance data to ARTCC's via PAMRI.

Automated Radar Terminal System - Model IIE — (Track Data) ➔ Radar Automated Display System

The ARTS associates surveillance data from the ASR with flight data and provides track data to the controller workstation RADS for display.

Automated Radar Terminal System - Model IIIA — (Flight Data) ➔ Airport Movement Area Safety System

AMASS receives aircraft tag data from the Automated Radar Tracking System (ARTS) via the Terminal Automation Interface Unit (TAIU). AMASS then evaluates the data along with surveillance data received from airport surveillance radar to generate visual and aural alerts of potential runway incursions and other unsafe conditions.

Automated Radar Terminal System - Model IIIA — (Track Data) ➔ Digital Bright Radar Indicator Tower Equipment

The ARTS sends terminal track data to the DBRITE for controller use.

Automated Radar Terminal System - Model IIIA — (Weather Data) ➔ Digital Bright Radar Indicator Tower Equipment

The ARTS sends terminal weather data to the DBRITE for controllers use.

Automated Radar Terminal System - Model IIIA — (Track Data) ➔ Full Digital Automated Radar Terminal System Display

Track data are exchanged between ARTS IIIA and the controller using FDAD.

Automated Radar Terminal System - Model IIIA — (Flight Data) ➔ Host Computer System

The ARTS IIIA provides flight data to HCS via PAMRI.

Automated Radar Terminal System - Model IIIA — (Track Data) ➔ Host Computer System

The ARTS IIIA provides surveillance data to HCS via PAMRI.

Automated Radar Terminal System - Model IIIA ⇐ (Track Data) ➔ Peripheral Adapter Module Replacement Item

The ARTS IIIA provides surveillance data to ARTCC's via PAMRI.

Automated Radar Terminal System - Model IIIA — (Surveillance Data) ➔ Precision Runway Monitor

The PRM receives messages containing ATC data that complements its surveillance data from the ARTS IIIA.

Automated Radar Terminal System - Model IIIE — (Flight Data) ➔ Airport Movement Area Safety System

AMASS receives aircraft tag data from the Automated Radar Tracking System (ARTS) via the Terminal Automation Interface Unit (TAIU). AMASS then evaluates the data along with surveillance data received from airport surveillance radar to generate visual and aural alerts of potential runway incursions and other unsafe conditions.

Automated Radar Terminal System - Model IIIE — (Track Data) ➔ Digital Bright Radar Indicator Tower Equipment

The ARTS sends terminal track data to the DBRITE for controller use.

Automated Radar Terminal System - Model IIIE — (Weather Data) ➔ Digital Bright Radar Indicator Tower Equipment

The ARTS sends terminal weather data to DBRITE for controller use.

Automated Radar Terminal System - Model IIIE — (Track Data) → Full Digital Automated Radar Terminal System Display

Track data are exchanged between ARTS IIIE and the controller using FDAD.

Automated Radar Terminal System - Model IIIE — (Flight Data) → Host Computer System

The ARTS IIIE provides flight data to HCS via PAMRI.

Automated Radar Terminal System - Model IIIE — (Track Data) → Host Computer System

The ARTS IIIE provides surveillance data to HCS via PAMRI.

Automated Radar Terminal System - Model IIIE ← (Track Data) → Peripheral Adapter Module Replacement Item

The ARTS IIIE provides surveillance data to ARTCC's via PAMRI.

Beacon Interrogator, Military — (Surveillance Data) → Microprocessor-En Route Automated Radar Tracking System

The OX-66 Replacement secondary surveillance radar forwards aircraft identification and position data to the Micro-EARTS for processing and use in controlling air traffic in the en route domain.

Beacon Interrogator, Military — (Surveillance Data) → Microprocessor-En Route Automated Radar Tracking System

The OX-66 secondary surveillance radar forwards aircraft identification and position data to the Micro-EARTS for processing and use in controlling air traffic in the en route domain.

Enhanced Terminal Voice Switch ← (Voice Communication) → Enhanced Terminal Voice Switch

This interface enables ATC voice communication between controllers in same or different facilities.

Enhanced Terminal Voice Switch ← (Voice Communication) → Integrated Communications Switching System Type I

This interface enables ATC voice communication between controllers in different facilities.

Enhanced Terminal Voice Switch ← (Voice Communication) → Integrated Communications Switching System Type III

This interface enables ATC voice communication between controllers in different facilities.

Enhanced Terminal Voice Switch ← (Voice Communication) → Rapid Deployment Voice Switch Type I

This interface enables ATC voice communication between controllers in different facilities.

Enhanced Terminal Voice Switch ← (Voice Communication) → Rapid Deployment Voice Switch Type II

This interface enables ATC voice communication between controllers in different facilities.

Enhanced Terminal Voice Switch ← (Voice Communication) → Rapid Deployment Voice Switch Type IIA

This interface enables ATC voice communication between controllers in different facilities.

Enhanced Terminal Voice Switch ← (Voice Communication) → Ultra High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Enhanced Terminal Voice Switch ← (Voice Communication) → Very High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Enhanced Terminal Voice Switch ← (Voice Communication) → Voice Switching and Control System

This interface enables ATC voice communication between controllers in different facilities.

Fixed Position Surveillance - Model 117 — (Surveillance Data) → Microprocessor-En Route Automated Radar Tracking System

The FPS-117 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the Micro-EARTS for processing and use in controlling air traffic in the en route domain.

Fixed Position Surveillance Model 20 Series — (Surveillance Data) → Air Traffic Control Beacon Interrogator - Model 6

The ATCBI-6 correlates return signals from the primary radar with the beacon signals and transmits the data to the automation system.

Fixed Position Surveillance Model 20 Series — (Surveillance Data) → Mode Select

The MODE S system correlates the primary radar returns with beacon data and transmits them to the automation system for tracking and display.

Fixed Position Surveillance Model 20 Series — (Surveillance Data) → Peripheral Adapter Module Replacement Item

The FPS ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the PAMRI interface, which then routes the data to the HCS and DARC for processing and use in controlling air traffic in the en route domain.

Fixed Position Surveillance Model 20 Series — (Weather Data) → Peripheral Adapter Module Replacement Item

The FPS long-range radar provides detected weather data to the PAMRI for processing at en route facilities.

Flight Data Input/Output ← (Flight Data) → Flight Data Input/Output

The FDIOs in ARTCCs, TRACONs, ATCTs, and two Oceanic centers (New York and Oakland) exchange flight data with FDIOs in other ARTCCs, FDIOs TRACONs, ATCTs, and two Oceanic Centers (New York and Oakland).

Flight Data Input/Output ← (Flight Data) → Peripheral Adapter Module Replacement Item

The FDIO systems communicate flight data to PAMRI.

Flight Data Input/Output Modification (Technical Refresh) ← (Flight Data) → Flight Data Input/Output Modification (Technical Refresh)

The FDIOs in ARTCCs, TRACONs, ATCTs, and two Oceanic centers (New York and Oakland) exchange flight data with FDIOs in other ARTCCs, FDIOs TRACONs, ATCTs, and two Oceanic Centers (New York and Oakland).

Flight Data Input/Output Modification (Technical Refresh) ← (Flight Data) → Peripheral Adapter Module Replacement Item

The FDIO systems communicate flight data to PAMRI.

Host Computer System ← (Flight Data) → Display System Replacement

The HCS sends flight data, time data, traffic management advisories to the DSR display and sends flight plans to the Flight Strip Printer. HCS receives flight plan amendments from ATC via entries on the R-position DSR.

Host Computer System ← (Track Data) → Display System Replacement

The HCS sends target fixes and track data to DSR and receives re-assignment of surveillance to sectors from ATCs as needed. (Note: the type of data passed to DSR is not raw surveillance data but rather is Target (fixes) and track (series of fixes) data produced by the HCS RDP.

Host Computer System — (Weather Data) → Display System Replacement

The HCS sends alphanumeric weather data to the DSR. Note: This is different from weather graphics, which is displayed on the DSR D-position from WARP.

Integrated Communications Switching System Type I ← (Voice Communication) → Integrated Communications Switching System Type I

This interface enables ATC voice communication between controllers in same or different facilities.

Integrated Communications Switching System Type I ← (Voice Communication) → Integrated Communications Switching System Type III

This interface enables ATC voice communication between controllers in different facilities.

Integrated Communications Switching System Type I ⇐ (Voice Communication) ⇒ Rapid Deployment Voice Switch Type I
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type I ⇐ (Voice Communication) ⇒ Rapid Deployment Voice Switch Type II
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type I ⇐ (Voice Communication) ⇒ Rapid Deployment Voice Switch Type IIA
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type I ⇐ (Voice Communication) ⇒ Ultra High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Integrated Communications Switching System Type I ⇐ (Voice Communication) ⇒ Very High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Integrated Communications Switching System Type I ⇐ (Voice Communication) ⇒ Voice Switching and Control System
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type III ⇐ (Voice Communication) ⇒ Integrated Communications Switching System Type III
This interface enables ATC voice communication between controllers in same or different facilities.
Integrated Communications Switching System Type III ⇐ (Voice Communication) ⇒ Rapid Deployment Voice Switch Type I
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type III ⇐ (Voice Communication) ⇒ Rapid Deployment Voice Switch Type II
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type III ⇐ (Voice Communication) ⇒ Rapid Deployment Voice Switch Type IIA
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type III ⇐ (Voice Communication) ⇒ Ultra High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Integrated Communications Switching System Type III ⇐ (Voice Communication) ⇒ Very High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Integrated Communications Switching System Type III ⇐ (Voice Communication) ⇒ Voice Switching and Control System
This interface enables ATC voice communication between controllers in different facilities.
Mode Select — (Surveillance Data) ⇒ Airport Surveillance Radar - Model 9
The ASR-9 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports and then sends the data to an automation system for tracking and display.
Mode Select — (Surveillance Data) ⇒ Automated Radar Terminal System - Model IIE
The Mode S sends aircraft identification, position, and altitude to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.
Mode Select — (Surveillance Data) ⇒ Automated Radar Terminal System - Model IIIA
The Mode S sends aircraft identification, position, and altitude to the ARTS IIIA for processing and use in controlling air traffic in the terminal domain.
Mode Select — (Surveillance Data) ⇒ Automated Radar Terminal System - Model IIIE
The Mode S sends aircraft identification, position, and altitude to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.
Mode Select — (Surveillance Data) ⇒ Peripheral Adapter Module Replacement Item
The Mode S ground station sends aircraft identification, position, and altitude to the PAMRI, which then routes to the HCS or DARC for processing and use in controlling air traffic in the en route domain.
Mode Select — (Surveillance Data) ⇒ Standard Terminal Automation Replacement System
The Mode S sends aircraft identification, position, and altitude to STARS for processing and use in controlling air traffic in the terminal domain.
Mode Select — (Surveillance Data) ⇒ Traffic Information System Avionics
Aircraft equipped with TIS Avionics can receive surveillance reports of all aircraft in the vicinity that responded to a Mode S interrogation. The data is sent via the Mode S datalink.
Mode Select Transponder — (Surveillance Data) ⇒ Air Traffic Control Beacon Interrogator - Model 4
The ATCBI-4 interrogates and receives aircraft identification, position and altitude information from aircraft equipped with the Mode S transponder.
Mode Select Transponder — (Surveillance Data) ⇒ Air Traffic Control Beacon Interrogator - Model 5
The ATCBI-5 interrogates and receives aircraft identification, position and altitude information from aircraft equipped with the Mode S transponder.
Mode Select Transponder — (Surveillance Data) ⇒ Air Traffic Control Beacon Interrogator - Model 6
The ATCBI-6 interrogates and receives aircraft identification, position and altitude information from aircraft equipped with the Mode S transponder.
Mode Select Transponder — (Surveillance Data) ⇒ Airport Surveillance Radar - Model 11
The integrated secondary surveillance radar on the ASR-11 interrogates onboard transponders to acquire identification, postion, and altitude data from the aircraft.
Mode Select Transponder — (Surveillance Data) ⇒ Beacon Interrogator, Military
The OX-66 Replacement secondary surveillance radar interrogates transponder-equipped aircraft to acquire aircraft identification and position data.
Mode Select Transponder — (Surveillance Data) ⇒ Beacon Interrogator, Military
The OX-66 secondary surveillance radar interrogates transponder-equipped aircraft to acquire aircraft identification and position data.
Mode Select Transponder — (Surveillance Data) ⇒ Mode Select
The Mode S interrogates and receives aircraft identification, position, altitude, and other information from aircraft equipped with the Mode S Transponder.
Mode Select Transponder — (Surveillance Data) ⇒ Precision Runway Monitor
The PRM interrogates the aircraft and its transponder replies with position and altitude data. The PRM provides for a 1-second update rate and displays arriving aircraft, data tags and track vectors indicating each airplane's position during closely-spaced parallel approaches.
Mode Select Transponder — (Surveillance Data) ⇒ Traffic Alert and Collision Avoidance System

The TCAS broadcasts interrogations and receives responses from Mode S transponders within range. It then processes the responses to provide proximity warning and conflict resolution instruction to the flight crew.

Peripheral Adapter Module Replacement Item — (Flight Data) → Host Computer System

The PAMRI is a conduit through which the HCS receives and exchanges flight data with remote FDIO flight strip printer system (printer/display/keyboard) as well as with external automation systems such as ARTS/STARS (TRACON), ODAPS/FDP2000 (Ocean), and FSM (ATCSCC). FDIO uses the General Purpose Input/Output (GPI/O) parallel interfaces and automation systems use the Interfacility Communications Input/Output (INTI/O) serial interfaces.

Peripheral Adapter Module Replacement Item — (Surveillance Data) → Host Computer System

The PAMRI passes surveillance data from the primary/secondary radars to the HCS for processing and use in controlling aircraft.

Peripheral Adapter Module Replacement Item — (Flight Data) → Peripheral Adapter Module Replacement Item

The PAMRI passes flight data between ARTCCs.

Peripheral Adapter Module Replacement Item — (Track Data) → Peripheral Adapter Module Replacement Item

The PAMRI passes track data between ARTCCs.

Precision Runway Monitor — (Surveillance Data) → Standard Terminal Automation Replacement System

The PRM provides highly accurate and rapidly updated azimuth data of aircraft to STARS for processing and use in controlling parallel approaches and landings.

Rapid Deployment Voice Switch Type I ← (Voice Communication) → Rapid Deployment Voice Switch Type I

This interface enables ATC voice communication between controllers in same or different facilities.

Rapid Deployment Voice Switch Type I ← (Voice Communication) → Rapid Deployment Voice Switch Type II

This interface enables ATC voice communication between controllers in different facilities.

Rapid Deployment Voice Switch Type I ← (Voice Communication) → Rapid Deployment Voice Switch Type IIA

This interface enables ATC voice communication between controllers in different facilities.

Rapid Deployment Voice Switch Type I ← (Voice Communication) → Ultra High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Rapid Deployment Voice Switch Type I ← (Voice Communication) → Very High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Rapid Deployment Voice Switch Type I ← (Voice Communication) → Voice Switching and Control System

This interface enables ATC voice communication between controllers in different facilities.

Rapid Deployment Voice Switch Type II ← (Voice Communication) → Rapid Deployment Voice Switch Type II

This interface enables ATC voice communication between controllers in same or different facilities.

Rapid Deployment Voice Switch Type II ← (Voice Communication) → Rapid Deployment Voice Switch Type IIA

This interface enables ATC voice communication between controllers in different facilities.

Rapid Deployment Voice Switch Type II ← (Voice Communication) → Ultra High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Rapid Deployment Voice Switch Type II ← (Voice Communication) → Very High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Rapid Deployment Voice Switch Type II ← (Voice Communication) → Voice Switching and Control System

This interface enables ATC voice communication between controllers in different facilities.

Rapid Deployment Voice Switch Type IIA ← (Voice Communication) → Rapid Deployment Voice Switch Type IIA

This interface enables ATC voice communication between controllers in same or different facilities.

Rapid Deployment Voice Switch Type IIA ← (Voice Communication) → Ultra High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Rapid Deployment Voice Switch Type IIA ← (Voice Communication) → Very High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Rapid Deployment Voice Switch Type IIA ← (Voice Communication) → Voice Switching and Control System

This interface enables ATC voice communication between controllers in different facilities.

Standard Terminal Automation Replacement System — (Flight Data) → Airport Movement Area Safety System

AMASS receives flight data from STARS. AMASS then evaluates the data along with surveillance data received from airport surveillance radar to generate visual and aural alerts of potential runway incursions and other unsafe conditions.

Standard Terminal Automation Replacement System — (Flight Data) → Host Computer System

The STARS provides flight data to ARTCCs via HCS.

Standard Terminal Automation Replacement System — (Track Data) → Host Computer System

The STARS provides flight data to ARTCCs via HCS.

Standard Terminal Automation Replacement System — (Track Data) → Peripheral Adapter Module Replacement Item

Flight data, track data, test data, and responses are exchanged between terminal and en route and between terminal and adjacent terminal.

Standard Terminal Automation Replacement System — (Track Data) → Standard Terminal Automation Replacement System Terminal Controller Workstation

The STARS provides aircraft positions and flight information to the STARS TCW for controller use.

Standard Terminal Automation Replacement System — (Weather Data) → Standard Terminal Automation Replacement System Terminal Controller Workstation

The STARS provides weather data information to the STARS TCW for controller use.

Ultra High Frequency Ground Radios ← (Voice Communication) → Ultra High Frequency Airborne Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Very High Frequency Ground Radios ← (Voice Communication) → Very High Frequency Airborne Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Very High Frequency Ground Radios ← (Voice Communication) → Very High Frequency Mobile Radios

Voice communication providing ATC coordination and direction between controllers and pilots and between controllers and ground vehicle operators.

Very High Frequency Ground Radios ← (Voice Communication) → Very High Frequency Multi-Mode Airborne Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Voice Switching and Control System ← (Voice Communication) → Ultra High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Voice Switching and Control System ← (Voice Communication) → Very High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Voice Switching and Control System ⇐ (Voice Communication) ⇒ Voice Switching and Control System

This interface enables ATC voice communication between controllers in same or different facilities.

Issues

none identified

Service Group Air Traffic Services

Service ATC-Advisory

Capability Traffic Advisory

Operational Improvement

Enhance Traffic Advisories using Digital Traffic Data (103206)

Pilots have an integrated cockpit display of traffic information (CDTI) for aircraft equipped with automatic dependent surveillance (ADS) and ground surveillance information. There is national availability of surrounding traffic information in the cockpit, including ADS - broadcast information and the rebroadcast of non-transmitting targets to aircraft.

30-Jun-2015 to 01-Jan-2010

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Automatic Dependent Surveillance - Broadcast (ADS-B) and Traffic Information Services - Broadcast (TIS-B) improve situational awareness in the cockpit with more accurate and timely digital traffic data provided directly to aircraft avionics for display to the pilot. The Federal Aviation Administration continues providing voice traffic advisories for users that do not have ADS-B/TIS-B and Cockpit Display of Traffic Information (CDTI) avionics. ADS-B and TIS-B, supplemented with the traditional traffic advisories provided by air traffic personnel, improve efficiency and safety and reduce frequency congestion in the en route and arrival/departure environments.

ADS-B Aircraft equipped with ADS-B avionics broadcast their position, which is pinpointed by onboard navigation avionics. Additional broadcast information includes airspeed, altitude, and planned course changes, as available. Other aircraft equipped with ADS-B avionics intercept the broadcasts and display the traffic data to the pilot on CDTI avionics. Ground Based Transceivers (GBT) also intercept the ADS-B reports.

TIS-B TIS-B is a surveillance service that provides broadcast digital traffic information to properly equipped aircraft and surface vehicles. One source of data for TIS-B is surveillance radars, including airport surveillance radar, air route surveillance radar, air traffic control beacon interrogators, and airport surface detection equipment. Other sources of TIS-B include multilateration systems, ADS-B, and other future surveillance systems. The Surveillance Data Network (SDN) maintains and distributes surveillance data from these sources. The GBT provides ADS-B data to the SDN for distribution. System Wide Information Management provides flight objects that include the surveillance data associated with flight data.

TIS-B reports are intended for properly equipped aircraft and surface vehicles in the GBT coverage area. The ADS-B/TIS-B avionics receive the GBT broadcast traffic data and display it to the pilot or surface vehicle operator on CDTI avionics. Where there is continuous surveillance and broadcast coverage, seamless TIS-B services is provided. TIS-B provides the quality level of traffic information that is dependent on the number and type of surveillance data sources available and the timeliness of the reported data.

ADS-B/TIS-B GBTs cover the airport surface, arrival/departure airspace, and en route airspace. GBTs are installed at 900 locations, including all secondary surveillance sites and 140 airports (4 stations each) to support ADS-B and TIS-B via Universal Access Transceiver (UAT) and 1090 data links. The ground stations transmit all ADS-B reports received down the 1090 link backup on the UAT link and vice versa. Surveillance data from non-ADS-B sources are transmitted on both the UAT and 1090 links.

Moving maps are used in conjunction with the traffic information to improve situational awareness on the airport surface and in the air. The pilot and surface vehicle operator have better information on their position on the surface and their relative position to other traffic. This aids the pilots and operators in low-visibility conditions. However, low- and no-visibility operations are not planned in the timeframe of this operational improvement.

Benefits

Safety is enhanced with improvement of the pilot's situational awareness through data link and display of real-time traffic information for the vicinity. With less need for controller-provided voice advisories, efficiency is improved. Broadcast and display of traffic information facilitate delegating separation responsibility to the pilot and potentially reducing separation standards, which would lead to increased capacity.

Systems

Air Route Surveillance Radar - Model 1E (key system)

The Air Route Surveillance Radar - Model 1E (ARSR-1E) is a 1970s analog radar. It is a long-range radar system with a maximum detection range of 200 nm. The ARSR-1E is a surveillance system used to detect azimuth and slant range of en route aircraft operating between terminal areas. It also provides weather intensity data.

Air Route Surveillance Radar - Model 2 (key system)

The Air Route Surveillance Radar - Model 2 (ARSR-2) is a 1970s analog radar. It is a long-range radar system with a maximum detection range of 200 nm. The ARSR-2 is a surveillance system used to detect azimuth and slant range of en route aircraft operating between terminal areas. It also provides weather intensity data.

Air Route Surveillance Radar - Model 3 (key system)

The Air Route Surveillance Radar - Model 3 (ARSR-3) is a 1980s radar that provides primary long range surveillance data, including slant range and azimuth data. It processes the returns which includes demodulation, analog-to-digital conversion, moving target indicator function, sensitivity time control, range and azimuth gating, and digital target extraction - all of which are performed digitally (with the exception of the demodulation and analog-to-digital conversion). In addition, the ARSR-3 has a weather channel with associated processing to provide weather contour information in digital format.

Air Route Surveillance Radar - Model 4 (key system)

The Air Route Surveillance Radar - Model 4 (ARSR-4) is a three-dimensional, long-range, rotating phased array, primary surveillance radar with integrated height finder capability. It is part of the joint surveillance system (JSS) used in conjunction with ARSR-3 coverage as part of the nationwide air defense command surveillance network. In addition to functions peculiar to the military, the ARSR-4 performs the same basic functions of the ARSR-3, by providing primary long-range surveillance data, including slant range and azimuth data.

Airport Surface Detection Equipment - Model 3 (key system)

Airport Surface Detection Equipment - Model 3 (ASDE-3) provides primary radar surveillance of aircraft and airport service vehicles on the surface movement area. ASDE-3 is installed at the busiest U.S. airports. Radar monitoring of airport surface operations (ground movements of aircraft and other supporting vehicles) provides an effective means of directing and moving surface traffic. This is especially important during periods of low visibility such as rain, fog, and night operations.

The ASDE-3 will undergo a SLEP to extend its service life through 2015 (see ASDE-3 SLEP), which will enable it to more effectively support AMASS (see) through this same time period.

Airport Surface Detection Equipment - Model 3 Service Life Extension Program (key system)

Airport Surface Detection Equipment - Model 3 Service Life Extension Program (ASDE-3 SLEP) provides for the technical refresh of the ASDE-3. The following components will be replaced or upgraded: antenna azimuth encoders, transmitter power supply modulators, digital processing circuit cards, display units, and other obsolete parts. The SLEP will extend the life of the ASDE-3 through 2015, which will allow it to support AMASS more effectively.

Future tech refreshes of the ASDE-3 will be included as part of the ASDE-3/AMASS Upgrade activity.

Airport Surveillance Radar - Model 11 (key system)

The Airport Surveillance Radar- Model 11 (ASR-11) is a digital, combined primary and secondary surveillance radar (SSR), short-range radar system with a 60 nautical mile (nmi) detection range for medium and small activity airports. The ASR-11 provides advanced digital primary radar including weather intensity surveillance with an integrated monopulse SSR system for use in the airport terminal area. The ASR-11 is used to detect and report the presence and location of an aircraft in a specific volume of airspace. The ASR-11 provides search radar surveillance coverage in controlled airspace primarily in terminal areas.

Airport Surveillance Radar - Model 9 (key system)

The Airport Surveillance Radar - Model 9 (ASR-9) is a short range (60 nm) radar system for the airport terminal area. The ASR-9 processes the returns from aircraft targets, which includes demodulation, analog-to-digital conversion, range and azimuth gating, sensitivity timing control, and a moving target detection function. The moving target detector includes two-level weather contour processing, digital signal processing, correlation and interpolation processing, and surveillance processing. The ASR-9 has a separate weather channel with associated processing capable of providing six-level weather contours. The two-level weather contour processing associated with the moving target detector is only be used for backup. The six-level weather channel is primarily used to supplement Next Generation Weather Radar (NEXRAD) coverage. It is normally used in conjunction with Mode Select (Mode S) but it can accommodate an Air Traffic Control Beacon Interrogator Model 4/5 (ATCBI-4/5).

The ASR-9 will be upgraded/replaced with the ASR-9/Mode S SLEP (see separate mechanism) in the 2007-12 time frame.

Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) (key system)

The Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) (ASR-9/Mode S (SLEP)) mechanism provide the necessary technical refresh to extend the service life of the ASR-9 and Mode S through 2030. The ASTERIX upgrade has not been implemented, but will be implemented at a later date.

Automated Radar Terminal System - Model IIIA (key system)

The Automated Radar Terminal System - Model IIIA (ARTS IIIA) provides radar data processing (RDP) and decision support tools to the controller in the terminal environment. Utilized at larger airports, ARTS IIIA is capable of receiving input from up to three sensors, can process up to 900 tracks simultaneously and support up to 36 displays. The RDP software provides automated surveillance tracking and display processing. Included in the ARTS IIIA software are decision support tools such as Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Mode C intruder alert, Converging Runway Display Aid (CRDA), Final Monitor Aid (FMA), and controller automation spacing aid.

Automated Radar Terminal System - Model IIIE (key system)

The Automated Radar Terminal System - Model IIIE (ARTS IIIE) consists of the hardware platform and software required providing radar data processing (RDP) and decision support tools to the controller in the terminal environment. The ARTS IIIE is used at consolidated Terminal Radar Approach Control (TRACON) facilities. The Common ARTS program provided an ARTS IIIE capable of receiving input from up to 15 sensors, the ability to process up to 10,000 tracks simultaneously, and support up to 223 displays. The RDP software provides automated surveillance tracking and display processing including mosaic display of radar data. Included in the ARTS IIIE software are decision support tools such as Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Mode C intruder alert, Converging Runway Display Aid (CRDA), Final Monitor Aid (FMA), and controller automation spacing aid.

Automated Radar Terminal System Color Display

The Automated Radar Terminal System (ARTS) Color Display (ACD) is a high performance, full function, color display that replaces the Full Digital ARTS Display (FDAD) and the Data Entry and Display Subsystem (DEDS). The ACD supports keyboard and trackball functions for the ARTS IIA, ARTS IIE, and ARTS IIIE. A primary and secondary radar data path to the ACD is provided by a radar gateway function incorporated in the event of a failure of either the ARTS IIE and ARTS IIIA processing systems.

Automatic Dependent Surveillance - Broadcast Avionics (key system)

Automatic Dependent Surveillance-Broadcast Avionics (ADS-B Avionics) transmits and receives Global Positioning System (GPS)-derived aircraft 4-dimensional position data, aircraft identification, aircraft velocity, and other selected aircraft data. Augmented GPS data may be required for certain applications. This is intended to be a surveillance system and not an avoidance system. The broadcast of own position is automatic and is intended to provide surveillance information to other users. The aircraft or vehicle originating the broadcast may not have knowledge of which users are receiving its broadcast. The ADS-B avionics are designed to transmit this 4-dimensional position data of own aircraft or vehicle and to also receive same type of information from others that are similarly equipped to receive and process ADS-B surveillance information.

BSGS Broadcast Services Ground Station (key system)

The BSGS (Broadcast Services Ground Station) supports Air-Ground broadcast services. This includes the reception of ADS-B from equipped aircraft/vehicles and the transmission of Traffic Information Service-Broadcast (TIS-B) and Flight Information Service-Broadcast (FIS-B) for use by equipped aircraft. Generally, the BSGS will interface via the SDN to provide ADS-B information to ATC automation and receive TIS-B and FIS-B information from TIS-B and FIS-B servers. The BSGS includes antenna(s), one or more dual link (i.e., 1090 MHz Extended Squitter-1090ES and Universal Access Transceiver-UAT) Ground Based Transceiver(s)(GBT), processing functions and communications functions. Several configurations of the BSGS are required to support variations in the geographic service volume and functions to be supported at specific categories of operational sites. BSGSs will be installed at 448 airports and 100 en route locations. Included are those airports equipped with Secondary Surveillance Radar (SSR) and about 140 additional towered airports (currently without SSR). The BSGS will support ADS-B and TIS-B services via both the 1090ES link and by the UAT link. The BSGS will also support FIS-B via the UAT link. BSGSs incorporate a multilink gateway function that provides ADS-B rebroadcasts via the ADS-B alternate link. A BSGS incorporating 2 GBTs are required for airport surface and terminal surveillance coverage at each of 268 smaller airports, a BSGS incorporating 3 GBTs (on average) are required at 120 of the mid-sized airports, and a BSGS incorporating 6 GBTs (on average) are required at the 60 largest airport (those equipped with ASDE-X or ASDE-3 surface surveillance systems).

The following BSGS functions are required to support the various categories of NAS BSGS sites, except as noted below: (1) 1090ES and UAT receive/transmit (i.e., the GBT funnction); (2) multi-link gateway function; (3) process received ADS-B messages and output (via the SDN) ADS-B reports for use by ATC automation; (4) accept TIS-B and FIS-B information from ground TIS-B/FIS-B servers and manage the generation and broadcast of link specific TIS-B messages via the 1090ES and UAT links and FIS-B messages via the UAT link.

The following BSGS configurations are assumed based on the category of the operational site. Except as noted below all BSGS configuration support the above described functions.

En route (100 sites): (1) One multi-sector antenna with each sector connected to the individual 1090ES and UAT receivers. Supports up to 250 nmi. ADS-B reception. En route locations that are intended to provide only low-altitude gap filler coverage do not require the long-range capability. (2) One omni-directional transmit antenna. Transmitter power sized to support the required TIS-B and FIS-B coverage for that specific site.

Terminal/Airport without ASDE-X (415 airports incl. 27 ASDE-3 equipped airports) with each site having: (1) BSGS with at least 2 GBTs with omni-directional antennas sited for both airport surface and terminal airspace coverage; (2) additional GBTs as needed to provide coverage of the primary airport surface movement area.

Terminal/Airport with ASDE-X (26 ASDE-X plus 7 upgraded ASDE-3 airports with an average of 6 GBTs per BSGS): (1) ASDE-X ground stations upgraded to support GBT functionality; (2) At least two of the GBTs provide ADS-B coverage to the edge of the terminal airspace and the TIS-B coverage; (3) ASDE provides the surveillance data source to support TIS-B for surface traffic.

Beacon Interrogator, Military (key system)

The UPX-39 is a new secondary surveillance radar beacon system that will replace the OX-60 secondary (beacon) radars in Alaska (12) and Hawaii (1) at the 13 joint-use (FPS-117 primary radar) facilities to improve the quality, reliability, and availability of radar data used for air traffic control and to reduce FAA and United States Air Force maintenance costs. The FAA will use existing interfaces to provide the radar data to the ARTCCs. The FAA provides technical support and funds its share of the cost associated with the fabrication, installation, and acceptance of 13 systems at the joint-use radar facilities.

Beacon Interrogator, Military (key system)

The OX-60 is a secondary (beacon) system collocated with the 12 joint-use FPS-117 long-range primary radars in Alaska and 1 joint-use FPS-117 in Hawaii. It is used to interrogate transponder-equipped aircraft, receive aircraft identification, determine aircraft position, and forward the information to appropriate U.S. Department of Defense and FAA air traffic control automation systems.

Cockpit Display of Traffic Information Avionics (key system)

The Cockpit Display of Traffic Information Avionics (CDTI Avionics) is a generic name for a display that provides the flight crew with surveillance information about other proximate aircraft, including their position. It enables pilots to electronically "see and avoid" other aircraft.

Digital Airport Surveillance Radar (key system)

The Digital Airport Surveillance Radar (DASR) provides advanced digital primary radar including weather intensity surveillance with an integrated mono-pulse Secondary Surveillance Radar (SSR) system for use in the airport terminal area. (Military version of ASR-11)

Digital Voice Recorder System

Provides modern digital voice recording devices used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

In Feburary 2004, the DVRS was upgraded with a 24-channel card, which replaced the 16-channel card. This minor upgrade, called DVR II, was not extended to the systems installed prior to February 2004.

Digital Voice Recorder System Replacement

The Digital Voice Recorder System Replacement (DVRS Replacement) is a modern digital system used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

En Route Automation Modernization (key system)

The En Route Automation Modernization System (ERAM System) will replace the existing diverse but functionally unequal primary and backup channels (Host and DARC) with redundant, functionally equivalent primary and backup channels. The new primary and backup channels achieve identical full functionality by using highly reliable fault tolerant processing elements running identical software. A tertiary system with diverse software, and physical and electronic isolation from the ERAM primary and back-up systems, will be maintained as fall back until the functionality, reliability, and availability of ERAM is demonstrated in the field. A training subsystem with functionality identical to the operational system will permit training to be conducted in parallel with operations.

In the past decade, several functions (URET, CTAS, etc.) were implemented as outboard processors/processes to the Host. As ERAM evolves in successive builds, this functionality will be integrated into ERAM as described below.

ERAM''s enhanced FDP will accommodate flexible routing around congestion, weather, and restrictions and improve efficiency by providing improved traffic flows. The enhanced ERAM surveillance processing will accomodate a larger geographic coverage, increased quantity of radar inputs and, when available, integration of Automatic Dependent Surveillance Broadcast data. In addition ERAM will use the improved accuracy and information disseminated by the sensors using the All-purpose Structured EUROCONTROL Radar Information Exchange (ASTERIX) format.

ERAM will allow for improved performance of decision support tools such as the Enhanced Traffic Management System (ETMS). ERAM will also incorporate Center-terminal radar approach control automation system (CTAS) functions (descent advisor, timelines, load graphs, automated miles-in-trail, and the situation display) and multi-center metering using miles-in-trail or time-based scheduling and meter lists.

ERAM will employ an industry standard LAN-based system to improve the efficiency of integrating commercial-off-the-shelf solutions in the future. ERAM software will be developed using a common high-level language to increase the FAA''s access to market-based skills and lower the cost of development and lifecycle maintenance. ERAM''s design will enable future enhancements and maintenance of components without affecting operational availability and increased productivity from an integrated monitor and control capability.

Fixed Position Surveillance Model 20 Series (key system)

The Fixed Position Surveillance Model 20 Series (FPS-20 Series) is a military primary radar of various models (FPS-20A, FPS-64, FPS-66A, FPS-67/A/B, and ARSR-60M) used by the FAA to detect slant range and azimuth of en route aircraft operating between terminals in the continental United States. Each of the different radar models is a similar variation of the original FPS-20 military radar.

Flight Information System - Data Link (key system)

The Flight Information System - Data Link (FISDL) provides Pilots weather, NOTAM, airfield information and other selected data through a service vendor operating on FAA provided VHF channels. The FISDL service is being facilitated through a FAA/Industry agreement allowing a commercial service provider to offer graphical and textual FIS/weather products to the cockpit of equipped aircraft. This vendor operated service is being provided as a near-term capability consistent with the FAA FIS Policy Statement of 1998. This vendor operated service will be phased out when the FAA is able to offer simliar FISDL services through FAA operated data link resources (e.g., via the UAT link using the BSGS and TIS-FIS Broadcast Server mechanism).

Future Air Navigation System 1/A (key system)

The Future Air Navigation System (FANS) is based on the International Civil Aviation Organization□s (ICAO) concept of a phased approach to implementing a modern, satellite-based, global Communication, Navigation, Surveillance/ Air Traffic Management (CNS/ATM) system. The following aircraft avionics are required to support an initial FANS implementation. These functions are referred to as FANS-1; the French developed equivalent for the Airbus A-330/340 is called FANS-A: Automatic Dependent Surveillance (ADS), ATC Data link, Airline Operational Control Data Link, Global Positioning System (GPS.

The FANS operational environment extends beyond the aircraft to include satellite, ground-based receiver/transmit stations, and a controller/pilot datalink system.

FANS 1/A consists of three message applications: AFN (ATS Facility Notification for logon to ATC via data link), ADS (Automatic Dependent Surveillance), CPDLC (Controller Pilot Data Link Communications). FANS 1/A uses the existing ACARS air/ground network to carry data link messages to/from the aircraft.

FANS 1 (Boeing implementation) was first certified in June of 1995 for use in the South Pacific. Oakland, Fiji, Aukland, and Brisbane FIRs were the initial participants for CPDLC using Inmarsat satcom. The latter three FIRs also used ADS for surveillance.

"The OEP identifies the ATOP program for implementation of FANS 1/A in Oakland, Anchorage and NY FIRs beginning in 2003." There are approximately 1000 FANS 1/A equipped aircraft in service as of mid-2002. All long-range model commercial transport aircraft have FANS 1 or FANS A either as standard equipment or as an option. In oceanic and remote areas, where FANS 1/A is currently in use, the Inmarsat geosynchronous satellite constellation provides the air/ground data link. HF data link will undergo trials as a FANS 1/A air/ground data link in late 2002-2003.

Host Computer System / Oceanic Computer System Replacement (key system)

The Host Computer System & Oceanic Computer System Replacement (HCS/OCSR--HOCSR) was implemented because of potential Y2K hardware issues with previous hardware. Accordingly, HCS/OCSR provided a new hardware platform, new peripherals (printers and Keyboard Display Video Terminals--KVDT), a new Direct Access Storage Device (DASD), and new OS-370 software extensions to control the new hardware using legacy NAS software applications. Hardware was replaced in both the En Route and Anchorage Oceanic automation environments. HCS/OCSR did not modify the legacy software functions of either the HCS system (e.g., flight data processing, radar data processing) or the Ocean Display and Planning System (ODAPS) automation systems (e.g., filght data processing). Likewise, HCS/OCSR did not impact HID NAS LAN, URET, DSR or PAMRI.

Phase 1 and 2 (mainframe and software extension replacements) were completed prior to 2000. Phase 3 (DASD replacement) was completed in 2003. Phase 4 (peripheral replacement) will be completed in 2004. Enhancement planned for 2005 and beyond were cancelled as they are overtaken by ERAM. Each phase has its own waterfall, and consequently no waterfall can be provided in the Location section below.

Mode Select (key system)

The Mode Select (Mode S) mechanism is a ground-based system capable of selective interrogation of Mode S transponders and general interrogation of Air Traffic Control Radar Beacon System (ATCRBS) transponders within range. The system also receives, processes, and forwards the transponder replies to appropriate air traffic control (ATC) automation systems. Data formats for both interrogation and reply include data exchange capability.

The system also provides a Traffic Information Services (TIS) function that makes local traffic data available to the flight deck via the Mode S data link. TIS, a Mode S data link service, provides automatic traffic advisories to properly equipped aircraft. Pilots are able to request and receive a display of nearby traffic. The relative range, bearing, and altitude (if known) and a "proximate" or "threat" classification of nearby aircraft will be displayed in the cockpit.

Mode Select En Route (Service Life Extension Program) (key system)

The Mode Select En Route (Service Life Extension Program) Mode S En Route(SLEP)) is a replacement of items that have become uneconomical to maintain or difficult to obtain. The ASTERIX upgrade has not been implemented, but will be implemented at a later date.

Power Systems

The Power Systems (Pwr Sys) mechanism provides for the conditioning of commercial power, including uninterruptible power systems (UPS), to eliminate voltage dropouts, surges, and voltage sags caused by sources outside the facility. Power distribution, grounding, bonding and shielding of electrical system within the facility is also part of the Pwr Sys.

The Power Systems (Pwr Sys) mechanism provides the following: 1.) ACEPS Busway Replacements, 2.) ACEPS EG Maintenance, 3.) ACEPS Monitoring & Diagnostics, 4.) ACEPS Fuel System Upgrade, 5.) ACEPS Training, 6.) Battery Monitoring, 7.) Training Facility, 8.) CPDS, 9.) Battery Replacements, 10.) DC Systems, 11.) EG, 12.) LPGBS, 13.) Power Cable, 14.) UPS, 15.) Contract Support.

Remote Automated Radar Terminal System (ARTS) Color Display

Remote Automated Radar Terminal System Color Display (R-ACD) Description The Remote - Automated Radar Terminal System (ARTS) Color Display (ACD) is a high performance, full function, and color display providing air traffic controllers with the functionality of the Digital Bright Radar Indicator Tower Equipment (DBRITE). This display supports keyboard and trackball functions for the ARTS II, ARTS IIE, and ARTS IIIE. A radar gateway function will be incorporated to provide a primary and secondary radar data path to the R-ACD in the event of failure of both the ARTS II and ARTS IIIA processing systems.

Standard Terminal Automation Replacement System (key system)

The Standard Terminal Automation Replacement System (STARS) processes primary and secondary radar information to acquire and track data points to display aircraft position for controllers. STARS provides safety tools such as, conflict alert (CA), Mode C intruder (MCI), final monitoring aid (FMA), Minimum Safe Altitude Warning (MSAW), Converging Runway Display Aid (CARDA), and Controller Automated Spacing Aid (CASA). Also, STARS provides the capability to implement the following enhancements: improved radar processing, Global Positioning System (GPS) compatibility, adaptive routing, Center Terminal Radar Approach Control (TRACON) Automation System (CTAS), data link implementation, improved weather display, and better utilization of traffic management information.

Standard Terminal Automation Replacement System Technological Refresh (key system)

The Standard Terminal Automation Replacement System Technological Refresh (STARS Tech Refresh) mechanism updates the STARS to replace obsolete hardware and installs STARS at older ARTS IIE and IIIE sites. STARS Tech Refresh will be deployed with Common ARTS functionality.

Surface Traffic Information Processor (key system)

The STIP would be an extension of the Automatic Dependent Surveillance-Broadcast (ADS-B)/Traffic Information Service - Broadcast (TIS-B) capability at 60 large airports equipped with Airport Surface Detection Equipment (ASDE) Model X or Model 3 systems. A processor would be added at each of these airports to support Traffic Information Service-Broadcast (TIS-B) services for surface and nearby low-altitude traffic. The STIP will receive surveillance information from the ASDE-X or ASDE-3 system and generate TIS-B messages for delivery by the Broadcast Services Ground Stations (BSGSs) providing surface coverage at that airport. The STIP will support of subset of the functionality of the TIS-FIS Broadcast Server (that is intended to support TIS-B for airborne users), but the STIP will support a more real-time TIS-B service with a higher update rates and lower latency consistent with the available surface surveillance data source and the needs to support surface movement operations.

Surveillance Data Network (key system)

National Airspace System (NAS) surveillance systems, including radar and automatic dependent surveillance systems will provide surveillance data objects via the Surveillance Data Network (SDN), which is a sub-network of the System Wide Information Management (SWIM) and the FAA Telecommunication Infrastructure (FTI). The published Surveillance Data Objects (SDO) will be made available to NAS and other users, including the Transportation Security Administration, Department of Defense, and others. Surveillance data availability supports 3-mile separation standards, gate-to-gate traffic management, seamless airspace, and dynamic resectorization. Improved surveillance information is provided in a timely and consistent manner seamlessly across the NAS for operations, planning, and decision making. The information will be available to all users and service providers via SDO in near real time. This information enables decisions to be based on a shared common view of situations, even as conditions are changing. Improved surveillance with SDOs will provide the automation higher quality of data for seamless surveillance and, in combination with other capabilities and new procedures, enable capacity and safety improvements. These benefits accrue from increased situation awareness by decision makers and improved operation of decision support and analysis tools that use surveillance information.

Surveillance Data Processor (key system)

SDP is a component of SAP and operates in En Route and Terminal. The SDP will make improvements to sensors and automation systems that will allow for expanded use of 3-mile separation and terminal procedures. The operational improvements enable more efficient control of aircraft and use of airspace. To accomplish this, all 1030/1090 Beacon interrogators will be upgraded to disseminate their existing 1.2 milli-radian azimuth accuracy and other information, such as time of measurement, confidence, quality, and so on. The automation system algorithms will be improved or new algorithms will be developed to exploit the additional information content of the improved surveillance reports. The method of presentation (display) to support 3-mile separation will be developed and tested to ensure safety. The existing long-range sensor surveillance update period is (12 seconds) and is insufficient to support 3-mile separation. In areas where only long-range sensors exist and where the Air Traffic Service requires 3-mile separation, these sensors may be modified to double the update rate to achieve 3-mile separation.

System Wide Information Management Build 1A

SWIM provides for National Airspace System (NAS)-wide transport and sharing of information between the Federal Aviation Administration and users. SWIM is a consistent and single point of entry for users to publish and subscribe to NAS data. SWIM provides context-sensitive information to NAS elements that require the information. SWIM replaces many single-focus networks, such as FIRMNet and CDMnet. This build will integrate Aeronautical, Weather, and NAS Resource Status information systems into the SWIM architecture. A SWIM Management Unit, at each facility, will support the sending (publishing) and receiving (subscribing) of data on SWIM and the SDN. A central SWIM Directory Management Unit will maintain a directory of data available for subscription and publication.

System Wide Information Management Build 1B (key system)

Build 1B provides all items in 1A, including more NAS information. This build integrates Flight and Surveillance Information systems into the SWIM architecture.

TIS-FIS Broadcast Server (key system)

TIS-FIS Broadcast Servers are located at 22 Air Route Traffic Control Centers and 8 consolidated Terminal Radar Approach Controls/Integrated Control Complex (ICC). TIS-Broadcast (TIS-B) is needed unless full Automatic Dependent Surveillance-Broadcast equipage is achieved. Servers will receive surveillance data (i.e., based on Secondary Surveillance Radar, etc.), from the Surveillance Data Processor (SDP), in the form of Surveillance Data Objects for each target aircraft and will create TIS-B reports. Servers will receive FIS data from weather processors. The TIS and FIS data will be geographically filtered for the defined service volume of each Broadcast Services Ground Station (BSGS), and TIS data will also be filtered for only non-ADS-B-equipped targets.

Support Activities

AT Training for Enhanced Traffic Advisories Through Improved Situational Awareness

Air Traffic (AT) training is provided to the AT workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AT Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

FAA Adaptation for Enhanced Traffic Advisories Through Improved Situational Awareness

Many NAS systems incorporate parameters that are adjustable. This allows for the setting of system parameters to optimize performance at each particular site. When new systems that have adjustable parameters are introduced into the NAS, adaptation data must be developed for the system. Environmental and procedural changes may also result in the need to modify FAA Adaptation Data. Generally, adaptation will begin 12 months before IOC and continue until 12 months after IOC.

Non-FAA Pilot Training for Enhanced Traffic Advisories Through Improved Situational Awareness

Non-FAA Pilot Training is provided to educate pilots as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional pilot training. Training will generally begin 60 days prior to IOC and be complete within one year following Full Operating Capability.

People

Airline Operations Center Dispatcher

The Airline Operations Center Dispatcher (AOC Dispatcher) is a major airline employee that enters bulk flight plan requests and works with FAA by revising schedules and providing flight cancellations based on FAA provided data (aggregate demand lists, arrival rates, and parameters for anticipated ground delays.)

Ground Controller

A Ground Controller performs the following activities: Ensure separation; Control vehicles as well as aircraft on movement areas other than active runways Initiate control instructions; Monitor and operate communications equipment; Utilize tower radar display(s); Utilize alphanumerics; Assist the tower associate controller with coordination; Scan tower cab environment; Ensure computer entries and strip marking are completed for instructions or clearances issued or received; Process and forward flight plan information; Perform any functions of the tower team which will assist in meeting situation objectives; Coordinate with local control for safe and efficient use of runways and movement areas.

Local Controller

A Local Controller performs the following activities: Ensure separation; Control active runways; Initiate control instructions; Monitor and operate communications equipment; Utilize tower radar display(s); Utilize alphanumerics; Assist the tower associate controller with coordination; Scan tower cab environment; Ensure computer entries and strip marking are completed for instructions or clearances issued or received; Process and forward flight plan information; Perform any functions of the tower team which will assist in meeting situation objectives; Coordinate with ground control for safe and efficient use of runways and movement areas.

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Radar Controller

A Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate automated handoffs; Assist the radar associate controller with non-automated handoff actions when needed; Assist the radar associate controller in coordination when needed; Scan radar display; Correlate with flight progress strip information; Ensure computer entries are completed on instructions or clearances you issue or receive; Ensure strip marking is completed on instructions or clearances you issue or receive.

Interfaces

Air Route Surveillance Radar - Model 1E — (Surveillance Data) → Mode Select

The MODE S system correlates the primary radar returns with beacon data and transmits them to the automation system for tracking and display.

Air Route Surveillance Radar - Model 2 — (Surveillance Data) → Mode Select

The MODE S system correlates the primary radar returns with beacon data and transmits them to the automation system for tracking and display.

Air Route Surveillance Radar - Model 4 — (Surveillance Data) → System Wide Information Management Build 1B

The ARSR-4 provides surveillance data to SWIM for distribution to automation systems and other authorized systems and users.

Air Route Surveillance Radar - Model 4 — (Weather Data) → System Wide Information Management Build 1B

The ARSR long-range radar provides detected weather data to SWIM for distribution.

Airport Surveillance Radar - Model 11 — (Surveillance Data) → Automated Radar Terminal System - Model IIIE

The ASR-11 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 11 — (Weather Data) → Automated Radar Terminal System - Model IIIE

The ASR primary radar provides detected weather data to the ARTS for processing.

Airport Surveillance Radar - Model 11 — (Surveillance Data) → Standard Terminal Automation Replacement System

The ASR-11 ground radar provides aircraft positional data (azimuth and slant range) to STARS for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 11 — (Weather Data) → Standard Terminal Automation Replacement System

The ASR-11 provides weather radar data to the STARS application interface gateway for display on its TCW and TDW displays. The radar and local controller uses these data to indicate the precipitation levels present within the TRACON and airport.

Airport Surveillance Radar - Model 11 — (Surveillance Data) → System Wide Information Management Build 1B

The ASR-11 provides surveillance data to SWIM for distribution to automation systems and other authorized systems and users.

Airport Surveillance Radar - Model 11 — (Weather Data) → System Wide Information Management Build 1B

The ASR primary radar provides detected weather data to SWIM for distribution.

Airport Surveillance Radar - Model 9 — (Surveillance Data) → Automated Radar Terminal System - Model IIIA

The ASR-9 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIA for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 9 — (Weather Data) → Automated Radar Terminal System - Model IIIA

The ASR terminal radar provides detected weather data to the ARTS for processing.

Airport Surveillance Radar - Model 9 — (Surveillance Data) → Automated Radar Terminal System - Model IIIE

The ASR-9 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 9 — (Weather Data) → Automated Radar Terminal System - Model IIIE

The ASR primary radar provides detected weather data to the ARTS for processing.

Airport Surveillance Radar - Model 9 — (Surveillance Data) → Standard Terminal Automation Replacement System

The ASR-9 ground radar provides aircraft positional data (azimuth and slant range) to STARS for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 9 — (Weather Data) → Standard Terminal Automation Replacement System

The ASR-9 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the STARS for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) — (Surveillance Data) → Standard Terminal Automation Replacement System

The ASR-9 ground radar provides aircraft positional (azimuth and slant range) as well as time tag, identification, and intent data in ASTERIX format to STARS for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) — (Surveillance Data) → System Wide Information Management Build 1B

The ASR-9 provides surveillance data to SWIM for distribution to automation systems and other authorized systems and users.

Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) — (Weather Data) → System Wide Information Management Build 1B

The ASR-9 provides surveillance data to SWIM for distribution to automation systems and other authorized systems and users.

Automatic Dependent Surveillance - Broadcast Avionics ← (Target Data) → Automatic Dependent Surveillance - Broadcast Avionics

Air-to-air ADS-B target data is exchanged between aircraft for use initially as a situation awareness enhancement. This capability will be expanded to other future applications, such as precision approach and landing and self separation.

Automatic Dependent Surveillance - Broadcast Avionics ← (Target Data) → BSGS Broadcast Services Ground Station

The GBT intercepts ADS-B transmissions from aircraft in the coverage area of the GBT. The GBT transmits ADS-B reports it receives down the UAT link back up the 1090 link and vice versa.

Automatic Dependent Surveillance - Broadcast Avionics — (Target Data) → Cockpit Display of Traffic Information Avionics

The ADS-B avionics provides the flight crew surveillance information about other aircraft in the area and is displayed on the CDTI. This information is initially used for enhanced situation awareness and will be expanded to other future applications such as precision approach and landing and self separation.

BSGS Broadcast Services Ground Station — (Weather Data) → Automatic Dependent Surveillance - Broadcast Avionics

ADS-B Avionics (with weather application) can receive FIS weather products broadcasted by the BSGS via an ADS-B data link.

BSGS Broadcast Services Ground Station ← (Target Data) → Surface Traffic Information Processor

BSGS antennas provide target data to the SMLSP for processing to support multilateration surveillance and Traffic Information Service-Broadcast (TIS-B) services for surface and low-altitude traffic. The processed data is then sent back to the BSGS for broadcasting.

BSGS Broadcast Services Ground Station — (Surveillance Data) → System Wide Information Management Build 1B

The GBT provides ADS-B reports to the SDN for distribution to automation systems and other authorized systems and user.

BSGS Broadcast Services Ground Station ← (Target Data) → TIS-FIS Broadcast Server
The TIS-FIS Broadcast Server exchanges data with the BSGS to form a surveillance broadcast reports, which are then broadcasted to users via the BSGS.
Fixed Position Surveillance Model 20 Series — (Surveillance Data) → Mode Select
The MODE S system correlates the primary radar returns with beacon data and transmits them to the automation system for tracking and display.
Mode Select — (Surveillance Data) → Airport Surveillance Radar - Model 9
The ASR-9 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports and then sends the data to an automation system for tracking and display.
Mode Select — (Surveillance Data) → Automated Radar Terminal System - Model IIIA
The Mode S sends aircraft identification, position, and altitude to the ARTS IIIA for processing and use in controlling air traffic in the terminal domain.
Mode Select — (Surveillance Data) → Automated Radar Terminal System - Model IIIE
The Mode S sends aircraft identification, position, and altitude to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.
Mode Select — (Surveillance Data) → Standard Terminal Automation Replacement System
The Mode S sends aircraft identification, position, and altitude to STARS for processing and use in controlling air traffic in the terminal domain.
Mode Select — (Surveillance Data) → System Wide Information Management Build 1B
The Mode S provides surveillance data to SWIM for distribution to automation systems and other authorized systems and users.
Mode Select En Route (Service Life Extension Program) — (Surveillance Data) → System Wide Information Management Build 1B
The Mode S provides surveillance data to SWIM for distribution to automation systems and other authorized systems and users.
Surface Traffic Information Processor — (Target Data) → System Wide Information Management Build 1B
The SMLSP provides target data reports to SWIM for distribution to automation systems and other authorized systems and user.
Surveillance Data Processor — (Surveillance Data) → BSGS Broadcast Services Ground Station
The SDP provides surveillance data for aircraft that are not responding to beacon interrogations or providing ADS-B reports to the GBT for transmission up both the UAT and 1090 links.
Surveillance Data Processor — (Surveillance Data) → TIS-FIS Broadcast Server
Surveillance data reports from the SDP, in the form of surveillance data objects, are sent to the TIS-FIS Broadcast Server to be geographically filtered for the defined service volume of each Broadcast Services Ground Station.
System Wide Information Management Build 1B — (Surveillance Data) → Automated Radar Terminal System - Model IIIE
The SDN distributes surveillance data received from various sensors to NAS automation systems.
System Wide Information Management Build 1B — (Flight Data) → BSGS Broadcast Services Ground Station
FOMS provides the flight object to the GBT for transmission to aircraft via SWIM.
System Wide Information Management Build 1B — (NAS Status Data) → BSGS Broadcast Services Ground Station
"The GBT receives NAS Status Data, including NOTAMS, via SWIM for broadcast to aircraft equipped with UAT communication equipment.
System Wide Information Management Build 1B — (Surveillance Data) → Standard Terminal Automation Replacement System
The SDN distributes surveillance data received from various sensors to NAS automation systems.
System Wide Information Management Build 1B — (Surveillance Data) → Surveillance Data Processor
The SDN distributes surveillance data received from various sensors to NAS automation systems.
TIS-FIS Broadcast Server — (Weather Data) → BSGS Broadcast Services Ground Station
FIS graphical weather products from the TIS-FIS Broadcast Server are sent to the BSGS for broadcasting.

Issues

Trades must be performed to determine how surveillance data will flow between GBT, SDN, SWIM (to get the flight data object), and the ADS-B/TIS-B Avionics.

Service Group Air Traffic Services
Service ATC-Advisory
Capability Weather Advisories Capability
Operational Improvement

Current En Route Advisory - Weather (103107)

Weather advisories alert traffic managers and controllers of hazardous weather (e.g., hail, icing, turbulence, and high winds) associated with thunderstorm activity. National Weather Service (NWS) meteorologists at each Air Route Traffic Control Center's Center Weather Service Unit and the Aviation Weather Center in Kansas City, MO, generate these advisories based on weather data from NWS and FAA sensors. Data also comes from airborne jetliners that downlink wind and temperature data via a meteorological data collection and reporting system (MDCRS) run by a communications service provider. Pilot reports (PIREP) of encountered weather are another valuable source of weather data. En Route controllers provide weather advisories to pilots via radio. Pilots also receive warnings that are recorded and broadcast via radio at selected very high frequency omnidirectional range (VOR) sites.
31-Jul-2003 to 01-Jan-2010

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Air Traffic Control (ATC) advisory - weather data goes to multiple en route decision makers. These data consist of observations of the current state of the atmosphere and forecasts. Observations may contain information relating hazardous (aviation-impacting) conditions or of routine weather (i.e., a surface observation on a good day). Similarly, forecasts may contain only routine weather (e.g., a Terminal Aerodrome Forecast (TAF) relating that no thunderstorms or adverse weather is expected). A TAF can contain both routine and hazardous weather (TAF with low visibility critical only to General Aviation (GA); or only hazardous weather, such as in a convective Significant Meteorological Information (SIGMET) message.

Today, en route weather data is processed and disseminated by the Center Weather Support Unit (CWSU) meteorologists at their workstation, the WARP. CWSU personnel are NWS employees working at each of the 20 FAA Air Route Traffic Control Centers (ARTCCs). En route weather data is also acquired and disseminated at the Air Traffic Control System Command Center (ATCSCC) by FAA personnel who have received meteorological training and also by the airline operation center dispatchers.

Aviation weather data is collected from various sources, both internal and external to the FAA, including commercial sources. For the most part, the NWS and FAA have their own equipment, but share large amounts of aviation weather data and products. Weather data/products, both hazardous and routine, come from numerous sources including radar systems, satellite sensors, PIREPs, vendor-supplied lightning data, Automated Surface Observing System (ASOS) and Automated Weather Observing System (AWOS), as well as weather observers.

CWSU meteorologists use WARP to receive and generate tailored products (e.g., advisories (Center Weather Advisory (CWA) and a Meteorological Impact Statement (MIS)) of convective activity, turbulence, etc.) to ARTCC traffic management specialists and controller supervisors to support various ATC operations. The CWA is an unscheduled weather advisory issued for controller use in alerting pilots of existing or anticipated adverse weather conditions expected during the next 2 hours. It can modify or redefine the area of a Convective SIGMET. The MIS is an unscheduled weather advisory providing similar information as the CWA, but forecasts out to 12 hours and is useful for flow control and flight operations planning.

Convective weather advisory services support two agency goals. The first is to collect, disseminate, and display current convective weather activity, which is essential for conducting safe aviation operations. Second, as convective weather accounts for over 50 percent of en route delays, it is absolutely necessary to have accurate forecasts of future convective activity if the capacity of the NAS is to meet air traffic demand when convective weather constrains routing.

Convective weather can disrupt traffic flow nationwide, causing massive flight delays and, in worst-case observations, cause aircraft accidents. Because of these impacts, the goal of the FAA is to provide timely weather and accurate forecasts to the aviation community (e.g., NAS service providers and users). Convective weather posing a significant impact to aircraft safety includes tornadoes, lines of thunderstorms, embedded thunderstorms, large hail, wind shear, moderate-to-extreme turbulence associated with thunderstorms, and light-to-severe in-flight icing. Also, areas of thunderstorm intensity greater than or equal to Video Integrator Processor level 3 with an area coverage of 40 percent or more can pose a threat to aircraft. To provide information on convective en route weather to pilots, en route controllers require timely weather radar information merged with their air traffic displays.

A major source of en route convective weather is the tri-agency (NWS, Department of Defense, and FAA) weather radar called the Next Generation Weather Radar (or NEXRAD). As part of the modernization of the national NEXRAD network, a new Radar Product Generator has been deployed that provides enhanced products with higher resolution to NAS service providers and users. Weather information is also available from the FAA's Air Route Surveillance Radars (ARSR-3/4). NEXRAD reflectivity intensity data (from WARP) as well as ARSR radars are displayed on the DSR (display system replacement) console, which provides en route sector controllers enhanced weather radar imagery integrated onto their traffic displays. The WARP processes data from multiple NEXRAD radars, creating a mosaic of precipitation intensity for DSR display. Each DSR displays radar reflectivity mosaics for three precipitation intensity levels at three different vertical levels (0-24KFT, 24-60KFT, and 0-60KFT) directly to air traffic controllers. In addition, a coverage map is displayed for the controllers that is updated every 25 seconds. The WARP provides traffic managers/supervisors with tailored products that are displayed on their remote briefing terminal. Some weather information (e.g., SIGMETs and AIRMETs) is output on paper strips for controller review and voice transmission to pilots. In other instances, controllers receive direct verbal communication from the weather coordinator, the CWSU meteorologist, another controller, pilot, or supervisor.

The Weather Message System Center Replacement (WMSCR) collects and processes a significant amount of textual weather data from the NWS and the United States Air Force Aviation Weather Network. This data is then disseminated, along with CWSU-generated advisories (CWA and MIS) and data from FAA weather systems, to Towers, Terminal Radar Control facilities, and Flight Service Stations, NWS weather forecast offices, and the airlines.

One of the best and most accurate sources of convective weather information comes directly from pilots. The en route controller or an in-flight specialist at an Automated Flight Service Station may receive these PIREPs, depending on their location. PIREPs are also sent to the AOC via direct radio contact or via Aircraft Communications Addressing and Reporting System data link. An automated PIREP, so to speak, is the datastream of airborne weather observations that are provided simultaneously to the FAA (for ITWS) and to the National Weather Service (for weather model use). The airlines and cargo carriers have significantly increased the number of their fleet aircraft that participate in the Meteorological Data Collection and Reporting System (MDCRS) program, which provides in situ observations of Winds & Temps. Humidity sensors are being added to more jetliners, and a Turbulence algorithm for incorporation into the flight management systems (FMS) is being tested. All three weather models (including the global model) used by the NAS benefit from MDCRS data, including the hourly Rapid Update Cycle model whose data output is used by FAA automation systems.

To assist en route ATC in alerting pilots of hazardous weather, the FAA implemented the National Flight Information Service (FIS). The FIS is defined as the non control, advisory information needed by pilots to operate safely and efficiently in the NAS and in international airspace. FIS includes information necessary for continued safe flight and for flight planning. Initial FIS delivers products to the cockpit by a vendor-provided data link that will allow pilots to better anticipate, plan, and request dynamic changes to the planned flight and to optimize fuel consumption and flight time. FIS products include NAS status information and basic meteorological information, in both textual and graphical formats. Later, FIS data will go to the cockpit via a digital data link to deliver NAS status and weather information to the pilot and, in doing so, will improve safety, reduce costs to users and the FAA, and increase the utility, efficiency, and capacity of the NAS.

The timely provision of high-quality, accurate, and consistent information is essential to support sound operational decisions by pilots, controllers, and dispatchers. Although Traffic Flow Management touches the terminal domain, the en route environment is where most of the decisions are made. WARP and Corridor Integrated Weather System provide NAS decisionmakers enhanced, more accurate weather products depicting impacts of weather on NAS operations. Forecast products in user-specified formats will depict current icing and turbulence, as well as thunderstorm movement out to 1 to 2 hours, enabling ARTCC traffic managers to conduct advance planning with AOCs and the ATCSCC to optimize unaffected jet routes.

Undergoing a concept of evaluation demonstration at this time is the Corridor Integrated Weather System (CIWS). A CIWS prototype currently provides forecasts of thunderstorm activity out to two hours for the corridor extending from Chicago eastward to Washington, DC, and up into New England. CIWS will provide forecast products tailored for use in corridors where thunderstorm activity constrains routing/re-routing options for traffic flow managers.

Benefits

Current operations are provided in the NAS.

Systems

Air Route Surveillance Radar - Model 3 (key system)

The Air Route Surveillance Radar - Model 3 (ARSR-3) is a 1980s radar that provides primary long range surveillance data, including slant range and azimuth data. It processes the returns which includes demodulation, analog-to-digital conversion, moving target indicator function, sensitivity time control, range and azimuth gating, and digital target extraction - all of which are performed digitally (with the exception of the demodulation and analog-to-digital conversion). In addition, the ARSR-3 has a weather channel with associated processing to provide weather contour information in digital format.

Air Route Surveillance Radar - Model 4 (key system)

The Air Route Surveillance Radar - Model 4 (ARSR-4) is a three-dimensional, long-range, rotating phased array, primary surveillance radar with integrated height finder capability. It is part of the joint surveillance system (JSS) used in conjunction with ARSR-3 coverage as part of the nationwide air defense command surveillance network. In addition to functions peculiar to the military, the ARSR-4 performs the same basic functions of the ARSR-3, by providing primary long-range surveillance data, including slant range and azimuth data.

Aircraft Weather Sensors (key system)

Aircraft Weather Sensors (A/C Wx Sensors) - Jetliners are equipped with weather sensors and automatically downlink weather data via Aircraft Communication and Reporting System (ACARS)/ Meteorological Data Collection and Reporting System (MDCRS) to the National Weather Service (NWS) (for use in weather models) and to the FAA (for use by ITWS). These weather sensors provide wind and temperature data.

Commercial Communications Service Provider (key system)

Commercial Communications Service Provider (CCSP) is a commercial entity who provides communications services for a fee.

Controller Pilot Data Link Communications Build 1

The Controller Pilot Data Link Communications Build 1 (CPDLC Build 1) - Initial deployment of CPDLC to Miami. Provides for the transmission and reception of messages between pilots and controllers in digital format. Specifically, request and acceptance of frequency changes on transfer from one sector to the next; initial pilot "check-in" to the sector and altitude verification; transmission of altimeter setting data, altitude, speed, heading assignments, route clearance, and non-critical messages from the controller to the pilot. CPDLC messages use the VDL-2 A/G communications sub-network provided by a Commercial Service Provider. CPDLC is comprised of two primary subsystems: the Data Link Applications Processor (DLAP) and the Context Management Application Processor Controller (CMAP). The DLAP functions as an Aeronautical Telecommunications Network (ATN) gateway for air-to-ground (A/G)data communications between air traffic control (ATC) en route automation equipment and aircraft. DLAP enables the transmission and reception of messages between pilots and controllers in digital format supporting Flight Information Services (FIS) and Controller-Pilot Data Link Communications (CPDLC). CPDLC messages use Very High Frequency Data Link Mode Two (VDL-2) A/G communications sub-network provided by a Commercial Service Provider. The CMAP is used to initiate a data link connection (logon). This connection includes the following information: aircraft and flight identification, departure airport, destination airport, and (optionally) time of departure. All CMAP functions shall comply with the International Civil Aviation Organization (ICAO) Aeronautical Telecommunications Network (ATN) Standard and Recommended Practices (SARPS) Class 1 Operations. The CMAP maintains a database of aircraft application information and addresses and provides the CPDLC application the information when requested. The CMAP also removes database entries after an established parameter time has expired.

Corridor Integrated Weather System

The CIWS collects various data, then processes, generates, displays, and distributes convective (thunderstorm) weather products to traffic managers at ATCSCC, certain ARTCCs and large TRACONs, and some large airports. The CIWS receives weather data from multiple sensors (primarily radars) and distributes processed thunderstorm information to NAS traffic managers via the System Wide Information Management (SWIM). This system will consist of a hardware processor and associated displays to be used in the TRACON, ARTCC, and ATCSCC.

Digital Voice Recorder System

Provides modern digital voice recording devices used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

In Feburary 2004, the DVRS was upgraded with a 24-channel card, which replaced the 16-channel card. This minor upgrade, called DVR II, was not extended to the systems installed prior to February 2004.

Digital Voice Recorder System Replacement

The Digital Voice Recorder System Replacement (DVRS Replacement) is a modern digital system used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

Display System Replacement (key system)

The Display System Replacement (DSR) provides continuous real-time, automated support to air traffic controllers for the display of surveillance, flight data and other critical control information. This information is processed by the Host and Oceanic Computer System Replacement (HOCSR) and the Enhanced Direct Access Radar Channel (EDARC) subsystems. The DSR provides controller workstations, displays, and input/output devices and a communications infrastructure to connect the DSR with external processing elements of the en route ATC automation system.

Enhanced Traffic Management System (key system)

The Enhanced Traffic Management System (ETMS) application is at the heart of the Traffic Flow Management (TFM) system, and through it flows the network of all TFM interfaces. ETMS at the Command Center deals with the strategic flow of air traffic at the national level. ETMS at remote facilities is used for local airspace management within the local facility''s own area of responsibility. To facilitate coordination between the Traffic Management Coordinators (TMC) at remote Traffic Management Units (TMUs) and the Traffic Management Specialists (TMS) at the Air Traffic Control System Command Center (ARTSCC), each local ETMS may can also view the national composite picture of traffic for which the Command Center has responsibility. ETMS enables TMS and TMC personnel to track and predict traffic flows, analyze effects of ground delays or weather delays, evaluate alternative routing strategies, and plan traffic flow patterns.

The ETMS central hub is located at the Volpe National Transportation System Center. The hub collects flight schedules, and revisions, from NAS users, and collects actual traffic situation updates from local ETMS TMUs, and combines these with planned traffic initiatives (e.g., Ground Delay Programs) to generate an Aggregate Demand List (ADL) that is output to users every five (5) minutes. The ADL contains predicted arrival and departure traffic at individual airports. NAS users, e.g., air carriers, can access the ADL data to plan and revise their flight schedules to work more efficiently with planned traffic initiatives. This interactive process of flight planning gives users more input to TMCs on how traffic initiatives will affect them and is the heart of the Collaborative Decision Making (CDM) process.

Traffic Management Units (TMUs) are located throughout the NAS amd perform local flow control management functions. TMUs exist in all Air Route Traffic Control Centers (ARTCCs), 35 high activity Terminal Radar Approach Control (TRACONs), 8 Air Traffic Control Towers (ATCTs), 3 Center Radar Approach (CERAP) facilities, and the WJHTC. TMU hardware suites are automated workstations that include computer entry/readout devices, network communications, Flight Strip Printer (FSP), and a Traffic Situation Display (TSD).

NAS users are responsible for providing their own connectivity to the ETMS hub. The various connective user networks are collectively referred to as the CDM Network (CDMnet) which provides two-way connectivity to ETMS. Non-FAA users do not have access to all ETMS data and processing tools.

Flight Information System - Data Link (key system)

The Flight Information System - Data Link (FISDL) provides Pilots weather, NOTAM, airfield information and other selected data through a service vendor operating on FAA provided VHF channels. The FISDL service is being facilitated through a FAA/Industry agreement allowing a commercial service provider to offer graphical and textual FIS/weather products to the cockpit of equipped aircraft. This vendor operated service is being provided as a near-term capability consistent with the FAA FIS Policy Statement of 1998. This vendor operated service will be phased out when the FAA is able to offer simliar FISDL services through FAA operated data link resources (e.g., via the UAT link using the BSGS and TIS-FIS Broadcast Server mechanism).

National Weather Service Workstation (key system)

The National Weather Service Workstation (NWS Workstation) enables the Meteorologist to create and disseminate aviation-related weather products (e.g., SIGnificant METeorological Information (SIGMETS), Terminal Aerodrome Forecasts (TAF), etc.) to the FAA and nearby NWS Weather Forecast Offices. The NWS uses various methods to disseminate these products (e.g., Commercial Communications Service Provider (CCSP), internet, NWS-to-FAA telecommunications gateways, etc) to the FAA.

Next Generation Weather Radar (key system)

The Next Generation Weather Radar (NEXRAD) system is a tri-agency (FAA, DoD, & NWS) Doppler weather radar to identify and track heavy precipitation and thunderstorm attribute information such as high wind velocity, hail, tornado, wind shear, precipitation intensity, and echo tops products. Mosaics of multiple NEXRADs are provided to FAA controllers on DSR (from WARP) and to DoD controllers on MicroEARTS (where they control aircraft NAS airspace). NEXRAD mosaics are also sent to traffic managers. Commercial weather vendors also recieve NEXRAD products.

Operational and Supportability Implementation System (key system)

Operational and Supportability Implementation System (OASIS): The capabilities provided by the OASIS include alphanumeric and graphic weather product acquisition and display, flight plan processing, search and rescue services, and law enforcement support. The OASIS provides a real-time, multi-user, computer-based system that provides current weather information, forecast weather information, Notice to Airmen (NOTAM) information, and flight planning.

OASIS also supports flight service specialists at International Automated Flight Service Stations (IAFSS) that provide services associated with aircraft transiting the oceans.

Power Systems

The Power Systems (Pwr Sys) mechanism provides for the conditioning of commercial power, including uninterruptible power systems (UPS), to eliminate voltage dropouts, surges, and voltage sags caused by sources outside the facility. Power distribution, grounding, bonding and shielding of electrical system within the facility is also part of the Pwr Sys.

The Power Systems (Pwr Sys) mechanism provides the following: 1.) ACEPS Busway Replacements, 2.) ACEPS EG Maintenance, 3.) ACEPS Monitoring & Diagnostics, 4.) ACEPS Fuel System Upgrade, 5.) ACEPS Training, 6.) Battery Monitoring, 7.) Training Facility, 8.) CPDS, 9.) Battery Replacements, 10.) DC Systems, 11.) EG, 12.) LPGBS, 13.) Power Cable, 14.) UPS, 15.) Contract Support.

Terminal Doppler Weather Radar - Technical Refresh

The Terminal Doppler Weather Radar technical refresh mechanism funds needed upgrades to the TDWR system. Improvements included replacing the system processor, upgrades to scan tracking (to 360 degree vice sector scan) and Radar Product Generator, Backup Communications, Uninterruptible Power Supply (UPS), modifications to battery, and safety modifications for the antenna.

Terminal Doppler Weather Radar Service Life Extension Program

The Terminal Doppler Weather Radar Service Life Extension Program (TDWR SLEP) mechanism funds the service live extension efforts to continue operation of the TDWR system. Upgrades include new hardware and re-hosting software for the Digital Signal Processor (DSP), RDA (receiver replacement), replacing antenna motors and hardened elevation drive bullgear/bearings.

U.S. Notice to Airmen System - Replacement (key system)

U.S. Notice to Airmen System - Replacement (USNS-R) system collects, processes, and maintains a processed Notice to Airmen (NOTAM) database consisting of all NOTAMs on domestic and foreign civilian and military facilities, services, procedures, etc., pertinent to National Airspace System (NAS) users and specialists; and an international (ICAO) NOTAM database exchanged with and accessible to international agencies. In addtion, GPS NOTAMs are maintained as well. The USNS-R will distribute the processed NOTAM to the respective user via the Aeronautical Information System (AIS) and Weather Message Switching Center Replacement (WMSCR). The USNS-R replaces the current Consolidated NOTAM System (CNS) and consists of an enhanced processor and the NOTAM Workstation.

Weather Message Switching Center Replacement (key system)

The Weather Message Switching Center Replacement (WMSCR) is the primary National Airspace System (NAS) interface with the National Weather Service (NWS) Telecommunications Gateway (NWSTG) for the exchange of aviation alphanumeric and limited gridded weather products. WMSCR collects, processes, stores, and disseminates aviation weather products to major NAS systems, the airlines, and international and commercial users. WMSCR also provides storage and distribution of domestic Notice To Airmen (NOTAM) data and retrieval of international NOTAMs through the Consolidated NOTAM System (CNS).

Weather Message Switching Center Replacement (WMSCR) Sustain (key system)

The Weather Message Switching Center Replacement (WMSCR) sustainment activity will sustain the existing WMSCR functionality of distributing alphanumeric weather text and NOTAM products through a hardware and software upgrade program. This upgrade program will consist of Commercial-off-the-Shelf processors, physical disk drives, workstations, network routers, printer, operating system, High Order Language programming software, and other commercially available software packages.

Weather and Radar Processor (Weather and Radar Processor) Stage 3 (key system)

The Weather and Radar Processor (WARP) Stage 3 provides gridded forecast weather data via the Weather Information Network System (WINS) to User Request Evaluation Tool Core Capability Limited Deployment (URET/CCLD), Enhanced Traffic Management System (ETMS), Dynamic Ocean Tracking System - Plus (DOTS-Plus), Advanced Technologies and Oceanic Procedures (ATOP), and Operational and Supportability Implementation System (OASIS).

People

Airline Operations Center Dispatcher

The Airline Operations Center Dispatcher (AOC Dispatcher) is a major airline employee that enters bulk flight plan requests and works with FAA by revising schedules and providing flight cancellations based on FAA provided data (aggregate demand lists, arrival rates, and parameters for anticipated ground delays.)

Broadcast Position

A Broadcast Position performs the following activities: Compile, evaluate, record, and disseminate weather and flight information through broadcasts (Transcribed Weather Broadcast (TWEB), Pilot's Automatic Telephone Weather Answering Service (PATWAS), Tactical Information Broadcast Service (TIBS), Hazardous Inflight Weather Advisory Service (HIWAS)).

Flight Service Specialist

A Flight Service Specialist performs the following activities:

* Provide services to aircraft in flight and during the pre-flight phase,

* Monitoring and restoration of NAVAID; Issuing local airport advisories,

* Relaying ATC clearances, advisories or requests,

* Issuing military flight advisory messages,

* Receiving and issuing NOTAMS,

* Assisting is search and rescue communication searches,

* Activating and closing flight plans,

* Making unscheduled broadcasts,

* Soliciting and issuing PIREPS,

* Presenting pilot weather briefings to airborne aircraft,

* Locating lost aircraft,

* Recording aircraft contacts,

* Providing weather advisories and flight plan services,

* Providing hazardous area reporting services, and

* Keeping airmen and weather information current.

Meteorologist

Meteorologists provide accurate and timely weather information for FAA facilities within their area of responsibility. They analyze and interpret real-time weather data from radar, satellites and pilot reports as well as NWS products such as terminal and area forecasts, and in-flight advisories.

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Radar Controller

A Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate automated handoffs; Assist the radar associate controller with non-automated handoff actions when needed; Assist the radar associate controller in coordination when needed; Scan radar display; Correlate with flight progress strip information; Ensure computer entries are completed on instructions or clearances you issue or receive; Ensure strip marking is completed on instructions or clearances you issue or receive.

Traffic Management Coordinators

Traffic Management Coordinators track and predict traffic flows, analyze ground delays, evaluate alternative routing strategies, and plan local traffic patterns at the local facility (ARTCC, TRACON, or Towers)

Traffic Management Specialist

Traffic Management Specialists perform the following activities: Balance air traffic demand with the airspace's capacity to maintain maximum and efficient utilization of the NAS; Coordinate and implement traffic management directives if needed for area of responsibility; Monitor and balance traffic flows within the area of responsibility in accordance with traffic management directives; Evaluate effectiveness of traffic management directives and make necessary adjustments; Document delay information.

Interfaces

Enhanced Traffic Management System ← (Flight Data) → Enhanced Traffic Management System

Enhanced Traffic Management System ← (Track Data) → Enhanced Traffic Management System

Enhanced Traffic Management System ← (Weather Data) → Enhanced Traffic Management System

Next Generation Weather Radar — (Weather Data) → Weather and Radar Processor (Weather and Radar Processor) Stage 3

WARP receives Doppler enhanced weather radar product (e.g., precipitation intensity, hail, tornado, etc) and status messages from individual NEXRAD sites recently upgraded due tri-agency Open Systems modernization effort.

Operational and Supportability Implementation System ← (NAS Status Data) → U.S. Notice to Airmen System - Replacement

The OASIS sends and receives NAS status data from the NOTAMS database via NADIN.

U.S. Notice to Airmen System - Replacement — (NAS Status Data) → Weather Message Switching Center Replacement

Distribution of NOTAMS re NAS status information to Weather Message Switching Center Replacement (WMSCR).

U.S. Notice to Airmen System - Replacement — (Weather Data) → Weather Message Switching Center Replacement

This interface supports the transfer of NOTAMS from the USNRS-R (formerly the Consolidated NOTAMS System) to the WMSCR for processing/forwarding onto NAS service providers, HCS, etc.

U.S. Notice to Airmen System - Replacement — (Weather Data) → Weather Message Switching Center Replacement (WMSCR) Sustain

Distribution of NOTAMS weather information to Weather Message Switching Center Replacement (WMSCR).

Weather Message Switching Center Replacement ← (Weather Data) → Operational and Supportability Implementation System

The WMSCR exchanges NOTAMS, alphanumeric weather products, PIREPS, and weather requests with OASIS.

Weather Message Switching Center Replacement (WMSCR) Sustain ← (Weather Data) → Operational and Supportability Implementation System

The WMSCR provides NOTAMS and alphanumeric weather products to OASIS.

Weather and Radar Processor (Weather and Radar Processor) Stage 3 — (Weather Data) → Display System Replacement

This interface provides an enhanced NEXRAD radar mosaic of precipitation intensity for three vertical layers, plus a combined layer product, to DSR.

Issues

none identified

Service Group Air Traffic Services

Service ATC-Advisory

Capability Weather Advisories Capability

Operational Improvement

Current Oceanic Advisory - Weather (103114)

Common situational awareness improves by providing location and intensity of thunderstorm activity over oceanic airspace to controllers, dispatchers, and pilots via alphanumeric messages.

28-Nov-2001 to 30-May-2016

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

General Weather advisories for oceanic operations include notification of thunderstorms, tropical cyclones, severe/extreme turbulence, or severe in-flight icing over an area affecting at least 3,000 square miles; or of embedded thunderstorms covering a much smaller area; plus any cloud-covered areas with lightning activity. Also, volcanic activity, though not a weather event and occurring infrequently, can produce ash clouds that reach cruise altitude and propagate via winds aloft for thousands of miles. Ash plume penetration by a jetliner has resulted in all engines shutting down and significant altitude loss before the pilot could restart engines to bring the aircraft under control.

At the oceanic ARTCCs in Oakland and New York, the Center Weather Service Unit (CWSU) meteorologists obtain information on oceanic weather from various sources to support the air traffic control and traffic management functions. Also having oceanic reponsibiilties is the Anchorage ARTCC. There, the Weather Coordinator (WC), a FAA air traffic controller, collects data from the CWSU and disseminates it to various supervisors. Dispatchers at the Airline Operations Centers (AOC) and third-party contract service providers also collect oceanic weather information.

Aviation Weather Aviation-impacting weather (e.g., convection, turbulence, or icing) over oceanic regions not only poses a safety hazard, but also can cause flight delays. In worst-case scenarios, encounters with convection or turbulence can result in aircraft damage and/or passenger and flight attendant injuries (or fatalities). Oceanic communications between pilots and controllers are not optimal and often time-consuming. As a result, it can take many minutes for a pilot to request a weather deviation and get a response from Air Traffic Control (ATC). Often, this requires a relay via the airline AOC dispatchers. In the event of an untimely response, a pilot is sometimes required to use his/her emergency decisionmaking authority and execute a non-coordinated divert [around the weather]. Occasionally, the resulting actions can cause a loss of standard separation from other aircraft in the vicinity without any transition. Any reduction in separation minimums, such as Reduced Vertical Separation Minima or decreasing lateral/longitudinal spacing, would require more accurate and timely weather forecasts of convection, turbulence, and in-flight icing products being delivered to the flight deck. This would allow sufficient time to assess the impact along the flight path and coordinate any diversions with ATC. Because of these impacts, it has always been the goal of the aviation community to have accurate, timely weather data over NAS oceanic regions. The primary concern is collecting, disseminating, and displaying convection, turbulence, and in-flight icing observations as well as providing accurate forecasts of their occurrence for strategic and tactical planning purposes.

Aviation Weather Data Sources

International Automated Flight Service Stations (IAFSS) in Oakland, New York, and Miami provide international pilot briefings and are equipped with en route/transoceanic communications. These sites have the telecommunications to obtain international weather information and to disseminate International Civil Aviation Organization (ICAO) flight plans. One of the best and most accurate sources of aviation-impacting weather information over oceanic regions comes directly from pilots. Pilot Reports (PIREP) contain a description of the actual flight conditions encountered (e.g.,turbulence, in-flight icing, winds, cloud-top levels) and other significant weather information. These PIREPs contain visual observations by the pilot and/or from the aircraft radar of weather occurrences such as lightning and thunderstorm formation. PIREPs are transmitted via direct radio communication with the oceanic controller or specialist at an Automated Flight Service Station. PIREPs are also sent to the AOC via direct radio contact or via data link. Third-party contract service providers also collect PIREPs for the AOC over oceanic regions. In addition, satellite imagery from Geostationary Orbiting Earth Satellites is available to to the oceanic controller. The AOC dispatcher also obtains this imagery but from commercial services. These data can also be displayed to the Air Route Traffic Control Center traffic management unit.

Weather Advisories

Advisories regarding reconvection, turbulence, or in-flight icing (and volcanic ash) are issued to pilots during preflight briefings by the AOCs and IAFSS or via computer self-briefings. While airborne, the pilot can receive these advisories from the controller or AOC dispatcher, or via a service provider data link. The messages contain information on the intensity and location of convective weather, turbulence, or in-flight icing along the flight path pertinent to safety of flight. The controller receives the advisory messages from the WC printed on a flight progress strip at the control position. Routine winds aloft and temperature data are provided to automation systems, such as Dynamic Ocean Tracking Plus, for transoceanic routing planning purposes for the pilot to exploit tail winds and avoid head winds where practical.

In addition, for oceanic regions, an International Significant Meteorological (SIGMET) Information advisory message is issued by the NWS' Aviation Weather Center in Kansas City that covers several events affecting aircraft safety. THE international SIGMET is valid for 4 hours for convection, turbulence, in-flight icing; 6 hours for tropical cyclones/hurricanes; and 12 hours for volcanic ash.

Traffic Management Traffic managers in the oceanic facilities and at the Air Traffic Control System Command Center have a role in planning for the effects of oceanic weather. After receiving a depiction of oceanic weather, oceanic ATC personnel work with AOC dispatchers to plan and generate flexible oceanic tracks. These tracks avoid areas of known convective activity, turbulence, and so forth and allow for maximum exploitation/avoidance of winds aloft and reflect current separation standards. DOTS (Dynamic Ocean Track System) uses forecasts of winds aloft to optimize oceanic routing. Only satellites and PIREPs provide weather information over the oceanic regions, but technology does exist that assists the specialist and meteorologist in planning for these routings.

Benefits

Current operations are provided in the NAS.

Systems

Air Traffic Services Interfacility Data Communications System (key system)

The Air Traffic Services Interfacility Data Communications System (AIDCS) provides ground-to-ground data link communications between U.S. Oceanic Air Traffic Control (ATC) centers and adjacent Flight Information Regions (FIRs). AIDCS is composed of a workstation processor and gateway router. The workstation serves as a translator between the National Airspace System (NAS) and the International Civil Aviation Organization (ICAO) formats for flight plans and coordination messages. The gateway router interfaces the workstation to the Oceanic Display and Planning System (ODAPS) Flight Data Processor and National Airspace Data Interchange Network II (NADIN II)/Aeronautical Fixed Telecommunications Network (AFTN).

Digital Voice Recorder System

Provides modern digital voice recording devices used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

In Feburary 2004, the DVRS was upgraded with a 24-channel card, which replaced the 16-channel card. This minor upgrade, called DVR II, was not extended to the systems installed prior to February 2004.

Dynamic Ocean Tracking System Plus (key system)

The Dynamic Ocean Tracking System Plus (DOTS Plus) automation system is located in each of the three Oceanic ARTCCs (Anchorage, Oakland, and New York) and in the ATCSCC. DOTS permits airlines to save fuel by flying random routes, in contrast to structured routes, and permit the air traffic controller to achieve lateral spacing requirements more efficiently. DOTS generates flexible oceanic tracks that are optimized for best airspace utilization and best time/fuel efficiency. Flexible tracks are updated twice a day using forecast winds aloft and separation (vertical and lateral) requirements. The DOTS oceanic traffic display gives a visual presentation of tracks and weather. DOTS sends traffic advisories and track advisories to users and receives aircraft progress reports from the commercial communications service providers. These external data exchanges are achieved through interfaces with the National Airspace Data Interchange Network (NADIN) Packet Switch Network (PSN) for Position Reports, Air Traffic Management (ATM) messages, Pilot Reports (PIREPS), and the Anchorage FDP2000. An interface to the Enhanced Traffic Flow Management System (ETMS) will improve coordination between the oceanic and domestic Traffic Flow Management (TFM) systems/activities. The DOTS Weather Server, installed at the Air Traffic Control System Command Center (ATCSCC), receives National Weather Service (NWS) wind and temperature data via the WARP/WINS system. The weather data is then distributed to the ARTCCs via commercially provided Integrated Services Digital Network (ISDN) telephone lines. DOTS Plus supports separation reduction initiatives as stipulated in RNP-10 (Required Navigation Performance) for decreasing lateral separation from 100 nautical miles to 50 nautical miles.

Future Air Navigation System 1/A (key system)

The Future Air Navigation System (FANS) is based on the International Civil Aviation Organization□s (ICAO) concept of a phased approach to implementing a modern, satellite-based, global Communication, Navigation, Surveillance/ Air Traffic Management (CNS/ATM) system. The following aircraft avionics are required to support an initial FANS implementation. These functions are referred to as FANS-1; the French developed equivalent for the Airbus A-330/340 is called FANS-A: Automatic Dependent Surveillance (ADS), ATC Data link, Airline Operational Control Data Link, Global Positioning System (GPS.

The FANS operational environment extends beyond the aircraft to include satellite, ground-based receiver/transmit stations, and a controller/pilot datalink system.

FANS 1/A consists of three message applications: AFN (ATS Facility Notification for logon to ATC via data link), ADS (Automatic Dependent Surveillance), CPDLC (Controller Pilot Data Link Communications). FANS 1/A uses the existing ACARS air/ground network to carry data link messages to/from the aircraft.

FANS 1 (Boeing implementation) was first certified in June of 1995 for use in the South Pacific. Oakland, Fiji, Aukland, and Brisbane FIRs were the initial participants for CPDLC using Inmarsat satcom. The latter three FIRs also used ADS for surveillance.

"The OEP identifies the ATOP program for implementation of FANS 1/A in Oakland, Anchorage and NY FIRs beginning in 2003." There are approximately 1000 FANS 1/A equipped aircraft in service as of mid-2002. All long-range model commercial transport aircraft have FANS 1 or FANS A either as standard equipment or as an option. In oceanic and remote areas, where FANS 1/A is currently in use, the Inmarsat geosynchronous satellite constellation provides the air/ground data link. HF data link will undergo trials as a FANS 1/A air/ground data link in late 2002-2003.

Oceanic Display and Planning System (key system)

The Oceanic Display and Planning System (ODAPS) consists of equipment that monitors and tracks aircraft over the ocean. It communicates and displays position data and flight plan information to the air traffic controllers responsible for monitoring and routing air traffic in the U.S. oceanic airspace. ODAPS has a situation display of aircraft position based on extrapolation of periodic voice position reports and filed flight plans. ODAPS includes a conflict probe (CP) functionality, which provides advance notification whenever stored flight plan information indicates that loss of separation minima may occur between aircraft, airspace reservations or warning areas.

Operational and Supportability Implementation System (key system)

Operational and Supportability Implementation System (OASIS): The capabilities provided by the OASIS include alphanumeric and graphic weather product acquisition and display, flight plan processing, search and rescue services, and law enforcement support. The OASIS provides a real-time, multi-user, computer-based system that provides current weather information, forecast weather information, Notice to Airmen (NOTAM) information, and flight planning.

OASIS also supports flight service specialists at International Automated Flight Service Stations (IAFSS) that provide services associated with aircraft transiting the oceans.

Power Systems

The Power Systems (Pwr Sys) mechanism provides for the conditioning of commercial power, including uninterruptible power systems (UPS), to eliminate voltage dropouts, surges, and voltage sags caused by sources outside the facility. Power distribution, grounding, bonding and shielding of electrical system within the facility is also part of the Pwr Sys.

The Power Systems (Pwr Sys) mechanism provides the following: 1.) ACEPS Busway Replacements, 2.) ACEPS EG Maintenance, 3.) ACEPS Monitoring & Diagnostics, 4.) ACEPS Fuel System Upgrade, 5.) ACEPS Training, 6.) Battery Monitoring, 7.) Training Facility, 8.) CPDS, 9.) Battery Replacements, 10.) DC Systems, 11.) EG, 12.) LPGBS, 13.) Power Cable, 14.) UPS, 15.) Contract Support.

Weather and Radar Processor (Weather and Radar Processor) Stage 3 (key system)

The Weather and Radar Processor (WARP) Stage 3 provides gridded forecast weather data via the Weather Information Network System (WINS) to User Request Evaluation Tool Core Capability Limited Deployment (URET/CCLD), Enhanced Traffic Management System (ETMS), Dynamic Ocean Tracking System - Plus (DOTS-Plus), Advanced Technologies and Oceanic Procedures (ATOP), and Operational and Supportability Implementation System (OASIS).

People

Airline Operations Center Dispatcher

The Airline Operations Center Dispatcher (AOC Dispatcher) is a major airline employee that enters bulk flight plan requests and works with FAA by revising schedules and providing flight cancellations based on FAA provided data (aggregate demand lists, arrival rates, and parameters for anticipated ground delays.)

Meteorologist

Meteorologists provide accurate and timely weather information for FAA facilities within their area of responsibility. They analyze and interpret real-time weather data from radar, satellites and pilot reports as well as NWS products such as terminal and area forecasts, and in-flight advisories.

Non-Radar Controller

A Non-Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate transfer of control, communications, and flight data; Ensure computer entries are completed on instructions or clearances issued or received; Ensure strip marking is completed on instructions or clearances issued or received.

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Interfaces

Dynamic Ocean Tracking System Plus — (Flight Data) → Dynamic Ocean Tracking System Plus

The DOTS + exchanges flight data.

Dynamic Ocean Tracking System Plus — (Target Data) → Dynamic Ocean Tracking System Plus

The DOTS + exchanges position reports.

Issues

>> FAA funding of aviation weather R&D is absolutely essential to developing more accurate, higher-resolution oceanic weather products (detection and forecasts) for convection, turbulence, and in-flight icing. >> WARP interface to above systems provides cost-effective source (vice vendors) of weather products

Service Group Air Traffic Services

Service ATC-Advisory

Capability Weather Advisories Capability

Operational Improvement

Current Terminal Advisory - Weather (103101)

Terminal controllers receive textual and graphical weather information. They use this information to provide pilots weather advisories of potentially hazardous weather conditions, including wind shear and microburst alerts, precipitation intensity levels, icing, and areas of low visibility, hail, lightning, and tornadoes. Controllers also transmit these advisories to pilots via radio. Pilots also receive recorded warnings that are broadcast via radio at selected very high frequency omnidirectional range (VOR) sites and on Automated Terminal Information System (ATIS). In addition to the broadcast weather advisories, pilots receive automated wind shear alerts via the Terminal Weather Information for Pilot (TWIP) system at NAS pacing airports.

23-May-2002 to 30-Dec-2011

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Terminal controllers ensure that pilots under their control are alerted to potentially aviation-impacting weather, including in-flight icing, wind shear, turbulence, hail, lightning, tornadoes, areas of low visibility, and heavy precipitation. To aid controllers in providing weather advisories, the FAA provides them with a variety of weather information from both FAA and tri-agency (FAA, NWS, DoD) weather sensors and processors, as well as aviation weather products from the National Weather Service (NWS). In addition, controllers receive procedures and phraseology to facilitate this task. Terminal controllers receive numerous text products of routine weather such as surface observations from the airport ASOS as well as Terminal Aerodrome Forecasts (TAFs) and Area Forecasts (FAs) from the NWS weather forecast offices. They also receive products (along with alerts) from FAA airport wind shear/microburst systems (i.e., the Terminal Doppler Weather Radar (TDWR), Low Level Wind shear Alert System (LLWAS), and the Weather System Processor (WSP)). Other text-based weather products received include convective Significant Meteorological Information (SIGMETs) from the Aviation Weather Center (AWC) and Center Weather Advisories (CWA) and Meteorological Impact Statements (MIS) from the Center Weather Service Unit (CWSU) at the nearest Air Route Traffic Control Center (ARTCC). At NAS pacing airports, TDWR also provides a gust-front detection and predictive capability that relates gust-front position, plus 10- and 20-minute forecasted positions. This enables controllers to rearrange arriving/departing air traffic for expected wind shifts, increasing landings and takeoffs as well as surface movement, thereby increasing airport acceptance rates during thunderstorm passage. Facility personnel review weather products to determine the geographical extent and potential operational impact of hazardous weather. Controllers must disseminate weather alerts based on the potential impact in their sector or area of control jurisdiction. Tower cab and approach control facility personnel may opt to broadcast hazardous weather information alerts only when any part of the area described is within 50 nautical miles of the airspace under their jurisdiction. Controllers within commissioned Hazardous In-flight Weather Advisory Service (HIWAS) areas broadcast HIWAS alerts on all frequencies, except emergency frequencies. The HIWAS is continuously recorded and provides broadcasts of weather hazards to airborne pilots over selected very high frequency omnidirectional range services. Controllers outside of commissioned HIWAS areas advise pilots of the availability of hazardous weather advisories. Pilots requesting additional information are told to contact the nearest En Route Flight Advisory Service position (sometimes called Flight Watch) at an Automated Flight Service Station (AFSS).

Wind Shear/Microburst Warnings

The FAA employs an integrated plan for wind shear coverge that significantly improves both the safety and capacity of the majority of the airports currently served by air carriers. This plan integrates several programs, including the Integrated Terminal Weather System (ITWS), TDWR, WSP, and LLWAS, comprising a single strategic concept that significantly improves the availability of wind shear/microburst information at over 100 of the busiest NAS airports.

Wind shear/microburst warnings from the above systems are displayed in the tower cab and the terminal radar approach control (TRACON) facility. These warnings can be integrated in an information display system or on their own display. Regardless of the system, these wind shear/microburst warnings are displayed textually in a standardized format so that the controller does not have to interpret the data, but simply reads the information to the pilot. To ensure that hazardous weather events are disseminated in a timely manner to the pilot, the controller constantly monitors these displays. Below is an example of what the controller sees on the displays in the tower cab for a Microburst Alert: 27A MBA 35K-2MF 250 20 The phraseology for issuing this alert to a pilot would be: RUNWAY 27 ARRIVAL, MICROBURST ALERT, 35 KT LOSS 2 MILE FINAL, THRESHOLD WIND IS 250 AT 20 KNOTS. In plain language, the controller is telling the pilot that there is a microburst alert on the approach course to runway 27, and to expect a 35-knot loss of airspeed at about 2 miles out on final approach (where the aircraft will first encounter the effects of the microburst). Thus, the aircrew is forewarned and prepared to apply wind shear/microburst escape procedures should they decide to continue the approach. Also included is a statement that the surface winds for landing on runway 27 are reported as 250 degrees at 20 knots. The controller uses the tower communications system to advise pilots of aviation-impacting weather conditions in/around the airport and to receive Pilot Reports (PIREPs). Local weather conditions, whether hazardous or of a routine nature, are also disseminated via the Digital Automatic Terminal Information Service. With its implementation in 2002, ITWS will become the primary source of integrated weather information at 47 of the busiest NAS terminals impacted by weather. With the integratingion of data and products from various FAA and NWS sensors, even airborne weather observations, ITWS-generated products will include wind shear and microburst predictions, storm cell and lightning information, data on terminal area winds up to 18kft, runway winds, and gust front location and predicted movement. These products will be integrated onto the Terminal Controller Workstation (TCW) and Tower Display Workstation (TDW), which that are also capable of displaying six distinct levels of precipitation intensity (identified by different colors) simultaneously with air traffic, This allows controllers to advise and/or reroute aircraft around heavy precipitation or severe weather conditions. To enhance common situational awareness of hazardous weather impacting pacing airports, the FAA implemented the Terminal Weather Information for Pilots (TWIP) program. TWIP assists in alerting pilots of to hazardous weather in the terminal area by integrating weather and communications technology to efficiently transmit a crude graphical depiction of wind shear/microburst weather events occurring at the busiest NAS airports to properly-equipped cockpits. TWIP transmits automated alerts of wind shear/microburst activity from the TDWR to the cockpit via the Addressing, Communications and Reporting System (ACARS) service provider. The information is sent via an ACARS data link to the jetliner cockpit via the Airport Operations Center (AOC). Current convective weather advisory services from TWIP also include information on precipitation intensity levels and gust fronts at the airport.

PIREP Information. The NAS depends upon the pilot to augment weather information derived from the FAA and NWS sources. Sophisticated cockpit avionics not only assist the pilot in avoiding convective weather, but also in reporting it to other NAS users via PIREPs. PIREP information includes: reports of strong frontal activity, squall lines, thunderstorms, light to severe icing, wind shear and turbulence (including clear air turbulence (CAT)) of moderate or greater intensity, volcanic eruptions/ash clouds, and other conditions affecting safety of flight.

Benefits

Current operations are provided in the NAS.

Systems

Automated Surface Observing System (key system)

The Automated Surface Observing System (ASOS) is an automated observing weather system sponsored by the FAA. ASOS provides weather observations, which include: temperature, dew point, wind, altimeter setting, visibility, sky condition, and precipitation. ASOS routinely and automatically provides a computer-generated voice to provide weather information directly to aircraft in the vicinity of airports using FAA very high frequency (VHF) ground-to-air radio. In addition, the same information is available through a dial-in telephone and most of the data is provided on the national weather data network.

Automated Surface Observing System Controller Equipment - Information Display System (key system)

The Automated Surface Observing System (ASOS) Controller Equipment (ACE) - Information Display System (ACE-IDS) is a hardware upgrade and software replacement to the ACE. The ACE-IDS is an integrated COTS/NDI system that allows data from multiple internal and external sources to be consolidated onscreen in many combinations and formats for easy access within a graphical user interface. Reference data, such as charts, maps, approach plates, procedures, etc., can be integrated with real-time data collected by interfaces to other systems.

Commercial Communications Service Provider (key system)

Commercial Communications Service Provider (CCSP) is a commercial entity who provides communications services for a fee.

Digital Voice Recorder System

Provides modern digital voice recording devices used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

In Feburary 2004, the DVRS was upgraded with a 24-channel card, which replaced the 16-channel card. This minor upgrade, called DVR II, was not extended to the systems installed prior to February 2004.

Digital Voice Recorder System Replacement

The Digital Voice Recorder System Replacement (DVRS Replacement) is a modern digital system used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

Integrated Terminal Weather System (key system)

The Integrated Terminal Weather System (ITWS) functions as a weather server in the terminal domain. It acquires data from FAA and National Weather Service (NWS) sensors as well as from aircraft in flight in the terminal area. The ITWS will provide aviation-oriented weather products to Air Traffic Control (ATC) personnel that are immediately usable without further meteorological interpretation.

Low-Level Windshear Alert System - Relocation/Sustain (key system)

The Low-Level Windshear Alert System - Relocation/Sustain (LLWAS-RS) is a system of wind sensors and processor that detects and identifies hazardous low-level wind shear and provides this information in real-time to terminal air traffic controllers. Terminal controllers then provide an air traffic advisory (weather) of the windshear hazard to pilots of aircraft on approach to or departure from the airport. The LLWAS-RS will replace the LLWAS-2 systems and provide the same performance capabilities as the Low-Level Windshear Alert System - Network Expansion (LLWAS-NE) with a remote monitoring capability.

National Weather Service Workstation (key system)

The National Weather Service Workstation (NWS Workstation) enables the Meteorologist to create and disseminate aviation-related weather products (e.g., SIGnificant METeorological Information (SIGMETS), Terminal Aerodrome Forecasts (TAF), etc.) to the FAA and nearby NWS Weather Forecast Offices. The NWS uses various methods to disseminate these products (e.g., Commercial Communications Service Provider (CCSP), internet, NWS-to-FAA telecommunications gateways, etc) to the FAA.

Power Systems

The Power Systems (Pwr Sys) mechanism provides for the conditioning of commercial power, including uninterruptible power systems (UPS), to eliminate voltage dropouts, surges, and voltage sags caused by sources outside the facility. Power distribution, grounding, bonding and shielding of electrical system within the facility is also part of the Pwr Sys.

The Power Systems (Pwr Sys) mechanism provides the following: 1.) ACEPS Busway Replacements, 2.) ACEPS EG Maintenance, 3.) ACEPS Monitoring & Diagnostics, 4.) ACEPS Fuel System Upgrade, 5.) ACEPS Training, 6.) Battery Monitoring, 7.) Training Facility, 8.) CPDS, 9.) Battery Replacements, 10.) DC Systems, 11.) EG, 12.) LPGBS, 13.) Power Cable, 14.) UPS, 15.) Contract Support.

Standard Terminal Automation Replacement System Terminal Controller Workstation (key system)

The Standard Terminal Automation Replacement System Terminal Controller Workstation (STARS TCW) provides the interface between the Terminal Radar Approach Control (TRACON) controller and the STARS processing unit.

Terminal Doppler Weather Radar (key system)

The Terminal Doppler Weather Radar (TDWR) system detects hazardous weather conditions such as windshear, microbursts and gust fronts, tornadic winds, heavy precipitation, and thunderstorms at an airport. This weather information is provided to air traffic on displays at terminal facilities. The TDWR also provides a 10- and 20-minute prediction of gust front location/movement.

Terminal Weather Information for Pilots (key system)

The Terminal Weather Information for Pilots (TWIP) mechanism provides jetliner pilots with direct access to limited weather information from each of 47 TDWR sites via a commercial communications service provider. TWIP enables jetliner pilots of equipped aircraft to view a rough depiction of hazardous weather (heavy precip, windshear/microbursts) similar to what is displayed in the tower and the Terminal Radar Approach Control (TRACON). TWIP is to be transitioned/incorporated into the Integrated Terminal Weather System (ITWS) and the Weather Systems Processor (WSP).

Weather System Processor (key system)

The Weather System Processor (WSP) provides precipitation, windshear, microburst, and precipitation data at 39 terminal areas that require wind shear coverage but do not warrant a Terminal Doppler Weather Radar. WSP generates weather products (microburst detection, gust front detection, wind shift prediction, and precipitation detection and tracking) derived from additional processing of Airport Surveillance Radar-9 (ASR-9) weather data.

People

Airline Operations Center Dispatcher

The Airline Operations Center Dispatcher (AOC Dispatcher) is a major airline employee that enters bulk flight plan requests and works with FAA by revising schedules and providing flight cancellations based on FAA provided data (aggregate demand lists, arrival rates, and parameters for anticipated ground delays.)

Clearance Delivery

A Clearance Delivery Controller performs the following activities: Operate communications equipment; process and forward flight plan information; issue clearances and ensure accuracy of pilot read back; assist tower cab in meeting situation objectives; operate tower equipment; utilize alphanumerics.

Flight Service Specialist

A Flight Service Specialist performs the following activities:

* Provide services to aircraft in flight and during the pre-flight phase,

* Monitoring and restoration of NAVAID; Issuing local airport advisories,

* Relaying ATC clearances, advisories or requests,

* Issuing military flight advisory messages,

* Receiving and issuing NOTAMS,

* Assisting is search and rescue communication searches,

* Activating and closing flight plans,

* Making unscheduled broadcasts,

* Soliciting and issuing PIREPS,

* Presenting pilot weather briefings to airborne aircraft,

* Locating lost aircraft,

* Recording aircraft contacts,

* Providing weather advisories and flight plan services,

* Providing hazardous area reporting services, and

* Keeping airmen and weather information current.

Ground Controller

A Ground Controller performs the following activities: Ensure separation; Control vehicles as well as aircraft on movement areas other than active runways Initiate control instructions; Monitor and operate communications equipment; Utilize tower radar display(s); Utilize alphanumerics; Assist the tower associate controller with coordination; Scan tower cab environment; Ensure computer entries and strip marking are completed for instructions or clearances issued or received; Process and forward flight plan information; Perform any functions of the tower team which will assist in meeting situation objectives; Coordinate with local control for safe and efficient use of runways and movement areas.

Local Controller

A Local Controller performs the following activities: Ensure separation; Control active runways; Initiate control instructions; Monitor and operate communications equipment; Utilize tower radar display(s); Utilize alphanumerics; Assist the tower associate controller with coordination; Scan tower cab environment; Ensure computer entries and strip marking are completed for instructions or clearances issued or received; Process and forward flight plan information; Perform any functions of the tower team which will assist in meeting situation objectives; Coordinate with ground control for safe and efficient use of runways and movement areas.

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Radar Controller

A Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate automated handoffs; Assist the radar associate controller with non-automated handoff actions when needed; Assist the radar associate controller in coordination when needed; Scan radar display; Correlate with flight progress strip information; Ensure computer entries are completed on instructions or clearances you issue or receive; Ensure strip marking is completed on instructions or clearances you issue or receive.

Ramp Controller

The Ramp Controller designated by the airline directs the movement of aircraft from the gates and on the ramp to a specific point that is defined by the agreement between the carrier and FAA.

Interfaces

Automated Surface Observing System — (Weather Data) → Automated Surface Observing System Controller Equipment - Information Display System

Provides weather observations which includes: temperature, dew point, wind, altimeter setting, visibility, sky condition, and precipitation.

Automated Surface Observing System — (Weather Data) → Integrated Terminal Weather System

ASOS distributes surface observations to ITWS. ITWS also obtains cloud-to-ground lightning data separately from the National Lightning Detection Network, a vendor-provided service. This information will be used by the ITWS algorithms to produce weather products for the radar and local controller as well as provide current weather conditions at the airport.

Automated Surface Observing System — (Weather Data) → Terminal Doppler Weather Radar

The ASOS sends wind speed/direction and wind gust data to the TDWR.

Automated Surface Observing System — (Weather Data) → Weather System Processor

The ASOS sends wind speed/direction and wind gust data to the WSP.

Automated Surface Observing System Controller Equipment - Information Display System — (Flight Data) → Automated Surface Observing System Controller Equipment - Information Display System

Routes to distributed and remote sites (IDS-4) flight progress information.

Automated Surface Observing System Controller Equipment - Information Display System — (NAS Status Data) → Automated Surface Observing System Controller Equipment - Information Display System

Provides near real-time status assessment of NAS resources and flight path conditions.

Automated Surface Observing System Controller Equipment - Information Display System — (Weather Data) → Automated Surface Observing System Controller Equipment - Information Display System

Routes to distributed and remote sites (IDS-4) temperature, dew point, windshear and direction, microburst detection and gust fronts, precipitation, thunderstorms cell motion, hail, tornado, lightning, runway visibility, relative humidity, altimeter setting, cloud heights, barometric pressure, NEXRAD radar mosaic, and turbulence.

Integrated Terminal Weather System — (Weather Data) → Integrated Terminal Weather System

The Integrated Terminal Weather System NFU located in the ATCSCC provides site-specific MDCRS and Rapid Update Cycle (RUC) forecast data to the other ITWS Product Generators which provide tailored products to Towers and TRACONs in CONUS and Puerto Rico.

Terminal Doppler Weather Radar — (Weather Data) → Integrated Terminal Weather System

TDWR provides microburst, gust front, runway oriented threshold winds, and center field wind products to the ITWS. Plus, base radar data and LLWAS-NE products will be merged by ITWS with data from other terminal weather sensors to develop ITWS weather products.

Terminal Weather Information for Pilots — (Weather Data) → Commercial Communications Service Provider

TWIP enables jetliner pilots of equipped aircraft to view a rough depiction of hazardous weather (heavy precip, windshear/microbursts) similar to what is displayed in the tower and the Terminal Radar Approach Control (TRACON) via the CCSP.

Issues

* TWIP success is dependent on two factors: 1) AOCs forwarding the wind shear/microburst data to their aircraft, and 2) Ability to display (avionics) that wind shear/microburst information to flight deck personnel * Convective Weather Forecast capability must be implemented in IOC ITWS - the impact of thunderstorm activity at NAS pacing airports ripples throughout much of the NAS, hence traffic managers must know of constrained ops at pacing airports * ITWS wind shear/MB prediction is dependent on MDCRS data, however, participating airlines threatening to turn off the MDCRS datastream unless FAA & NWS pay some of their Comms costs * RUC model forecast data only available hourly if MDCRS received

Service Group Air Traffic Services

Service ATC-Advisory

Capability Weather Advisories Capability

Operational Improvement

Deploy FIS-B Nationally (103104)

Flight Information Services - Broadcast (FIS-B) currently enables pilots to receive text and graphical weather information via a vendor-provided service (including data link). Free access to basic weather and NAS status information are available to properly equipped aircraft. En route weather server (WARP/GWIS) will provide the FIS vendor with weather data in the future.

31-Jul-2011 to 10-Jul-2013

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

This operational improvement involves national deployment of a capability to data-link graphic and textual weather information to aircraft for display on Cockpit Display of Traffic Information (CDTI) avionics, which uses moving maps. Flight Information Service-Broadcast (FIS-B) is deployed to provide weather coverage on the airport surface, in terminal airspace, and in en route airspace. FIS-B improves pilot situational awareness relative to expected hazardous weather and helps reduce radio frequency congestion and controller workload. The Ground Based Transceivers (GBT) that transmit FIS-B over Universal Access Transceiver (UAT) data links are installed at 900 locations, including all secondary surveillance sites and 140 airports (4 stations each) to support FIS-B as well as Automatic Dependent Surveillance Broadcast (ADS-B)/Traffic Information System Broadcast. UAT communications avionics aboard general aviation aircraft will receive the FIS-B data and send it to the CDTI avionics for display to the pilot. The FAA will provide weather information to unequipped aircraft per current procedures. Data link via ADS-B on 1090-megahertz communications will not be available until after 2015, as the data-link technology will not be in place. Also, many aircraft will not be equipped with ADS-B Avionics.

An in-depth understanding of decisions affected by weather, operations, phase of flight, aircraft, and pilot ability, leads to development of appropriately tailored weather products, including required content, desired level of complexity, and preferred delivery format (visual, aural, etc.). Delivery of weather products in different formats to onboard avionics from various sources is transparent to the cockpit. Pilots receive increasingly tailored weather information, which is updated frequently as they cross open or redesigned airspace. Weather sensor data is transmitted to weather processors and FIS-B vendors via the System Wide Information Management (SWIM). Also, weather products from domain processors such as Integrated Terminal Weather System and Weather and Radar Processor, Global Weather Information System (WARP successor), and the GWIS successor, the General Weather Processor (GWP), are disseminated to FIS-B vendors via SWIM and the SWIM Management Unit. The GWP composes weather reports for dissemination via SWIM and Aeronautical Information Management (AIM) to the GBT for broadcast to properly equipped aircraft in the coverage area. A complete suite of graphical and textual products that include precipitation, lightning, in-flight icing, low-ceiling/visibility maps, surface hazards, wind shear and turbulence information, and site-specific weather reports and forecasts, will be sent via FIS-B to the cockpit. The information also includes current observations, Pilot Reports, hazardous phenomena (via Significant Meteorological information and Airman Meteorological Information), winds aloft, and runway braking-action advisories.

Benefits

Safety is enhanced, as the pilot has real-time access to data-linked weather information. Pilots need controller-provided voice weather advisories less frequently, which improves efficiency.

Systems

Aeronautical Information Management (key system)

The AIM system represents the evolution of the acquisition, storage, processing and dissemination of aeronautical information in the NAS. Aeronautical information is defined as any information concerning the establishment, condition, or change in any component (facility, service, or procedure of, of hazard) of the National Airspace System. Aeronautical information comes in two types a somewhat static type, and a more dynamic type. The static portion represents the aeronautical information baseline as a particular date, while the dynamic portion updates particular aspects of the static portion due to system impacts or events. The Static portion represents data that NAS automation systems and other users use to adapt their software to properly operate. The dynamic portion represents information typically contained in NOTAMs that indicate short-term changes to the static data.

Many NAS systems support the acquisition, generation, and dissemination of the static aeronautical information. Information of this type includes airspace structures, airways, locations of NAS facilities, inter-facility letters of agreement and memorandums of understanding, obstructions, standard procedures, airspace charts, etc.

Several NAS systems also support the acquisition, generation, processing, and dissemination of the dynamic aeronautical information. Information of this type includes, facility outages, runway closures, temporary flight restrictions, airspace constraints, SIGMETs, etc. This information must be disseminated to users and providers of air traffic services in a timely and efficient manner.

AIM will provide the central point for the dissemination of high quality, configuration controlled information to NAS systems, service providers and users of the NAS. AIM will disseminate data based on the Aeronautical Information Exchange Model (AIXM) protocols.

Automatic Dependent Surveillance - Broadcast Avionics (key system)

Automatic Dependent Surveillance-Broadcast Avionics (ADS-B Avionics) transmits and receives Global Positioning System (GPS)-derived aircraft 4-dimensional position data, aircraft identification, aircraft velocity, and other selected aircraft data. Augmented GPS data may be required for certain applications. This is intended to be a surveillance system and not an avoidance system. The broadcast of own position is automatic and is intended to provide surveillance information to other users. The aircraft or vehicle originating the broadcast may not have knowledge of which users are receiving its broadcast. The ADS-B avionics are designed to transmit this 4-dimensional position data of own aircraft or vehicle and to also receive same type of information from others that are similarly equipped to receive and process ADS-B surveillance information.

BSGS Broadcast Services Ground Station (key system)

The BSGS (Broadcast Services Ground Station) supports Air-Ground broadcast services. This includes the reception of ADS-B from equipped aircraft/vehicles and the transmission of Traffic Information Service-Broadcast (TIS-B) and Flight Information Service-Broadcast (FIS-B) for use by equipped aircraft. Generally, the BSGS will interface via the SDN to provide ADS-B information to ATC automation and receive TIS-B and FIS-B information from TIS-B and FIS-B servers. The BSGS includes antenna(s), one or more dual link (i.e., 1090 MHz Extended Squitter-1090ES and Universal Access Transceiver-UAT) Ground Based Transceiver(s)(GBT), processing functions and communications functions. Several configurations of the BSGS are required to support variations in the geographic service volume and functions to be supported at specific categories of operational sites. BSGSs will be installed at 448 airports and 100 en route locations. Included are those airports equipped with Secondary Surveillance Radar (SSR) and about 140 additional towered airports (currently without SSR). The BSGS will support ADS-B and TIS-B services via both the 1090ES link and by the UAT link. The BSGS will also support FIS-B via the UAT link. BSGSs incorporate a multilink gateway function that provides ADS-B rebroadcasts via the ADS-B alternate link. A BSGS incorporating 2 GBTs are required for airport surface and terminal surveillance coverage at each of 268 smaller airports, a BSGS incorporating 3 GBTs (on average) are required at 120 of the mid-sized airports, and a BSGS incorporating 6 GBTs (on average) are required at the 60 largest airport (those equipped with ASDE-X or ASDE-3 surface surveillance systems).

The following BSGS functions are required to support the various categories of NAS BSGS sites, except as noted below: (1) 1090ES and UAT receive/transmit (i.e., the GBT funnction); (2) multi-link gateway function; (3) process received ADS-B messages and output (via the SDN) ADS-B reports for use by ATC automation; (4) accept TIS-B and FIS-B information from ground TIS-B/FIS-B servers and manage the generation and broadcast of link specific TIS-B messages via the 1090ES and UAT links and FIS-B messages via the UAT link.

The following BSGS configurations are assumed based on the category of the operational site. Except as noted below all BSGS configuration support the above described functions.

En route (100 sites): (1) One multi-sector antenna with each sector connected to the individual 1090ES and UAT receivers. Supports up to 250 nmi. ADS-B reception. En route locations that are intended to provide only low-altitude gap filler coverage do not require the long-range capability. (2) One omni-directional transmit antenna. Transmitter power sized to support the required TIS-B and FIS-B coverage for that specific site.

Terminal/Airport without ASDE-X (415 airports incl. 27 ASDE-3 equipped airports) with each site having: (1) BSGS with at least 2 GBTs with omni-directional antennas sited for both airport surface and terminal airspace coverage; (2) additional GBTs as needed to provide coverage of the primary airport surface movement area.

Terminal/Airport with ASDE-X (26 ASDE-X plus 7 upgraded ASDE-3 airports with an average of 6 GBTs per BSGS): (1) ASDE-X ground stations upgraded to support GBT functionality; (2) At least two of the GBTs provide ADS-B coverage to the edge of the terminal airspace and the TIS-B coverage; (3) ASDE provides the surveillance data source to support TIS-B for surface traffic.

Cockpit Display of Traffic Information Avionics (key system)

The Cockpit Display of Traffic Information Avionics (CDTI Avionics) is a generic name for a display that provides the flight crew with surveillance information about other proximate aircraft, including their position. It enables pilots to electronically "see and avoid" other aircraft.

Commercial Communications Service Provider (key system)

Commercial Communications Service Provider (CCSP) is a commercial entity who provides communications services for a fee.

Digital- Automated Terminal Information Service SLEP

This extends the life of the D-ATIS.

Integrated Terminal Weather System (key system)

The Integrated Terminal Weather System (ITWS) functions as a weather server in the terminal domain. It acquires data from FAA and National Weather Service (NWS) sensors as well as from aircraft in flight in the terminal area. The ITWS will provide aviation-oriented weather products to Air Traffic Control (ATC) personnel that are immediately usable without further meteorological interpretation.

National Weather Service Workstation (key system)

The National Weather Service Workstation (NWS Workstation) enables the Meteorologist to create and disseminate aviation-related weather products (e.g., SIGnificant METeorological Information (SIGMETS), Terminal Aerodrome Forecasts (TAF), etc.) to the FAA and nearby NWS Weather Forecast Offices. The NWS uses various methods to disseminate these products (e.g., Commercial Communications Service Provider (CCSP), internet, NWS-to-FAA telecommunications gateways, etc) to the FAA.

Power Systems

The Power Systems (Pwr Sys) mechanism provides for the conditioning of commercial power, including uninterruptible power systems (UPS), to eliminate voltage dropouts, surges, and voltage sags caused by sources outside the facility. Power distribution, grounding, bonding and shielding of electrical system within the facility is also part of the Pwr Sys.

The Power Systems (Pwr Sys) mechanism provides the following: 1.) ACEPS Busway Replacements, 2.) ACEPS EG

Maintenance, 3.) ACEPS Monitoring & Diagnostics, 4.) ACEPS Fuel System Upgrade, 5.) ACEPS Training, 6.) Battery Monitoring, 7.) Training Facility, 8.) CPDS, 9.) Battery Replacements, 10.) DC Systems, 11.) EG, 12.) LPGBS, 13.) Power Cable, 14.) UPS, 15.) Contract Support.

Surface Traffic Management System (key system)

The Surface Traffic Management System (STMS) provides flight and track data for surface management, combining the functions of SMA (FFP1) and SMS Prototype systems. Similar to SMS, the STMS servers and display processors will be located at the same facilities and, in addition, display processors will be located at the ATCSCC and Hub site. STMS data will include gate assignment information, downstream restrictions and air carrier predictions of flight push-back times. STMS may be enhanced to add communications via data link to the cockpit.

System Wide Information Management Build 1B (key system)

Build 1B provides all items in 1A, including more NAS information. This build integrates Flight and Surveillance Information systems into the SWIM architecture.

Terminal Doppler Weather Radar - Technical Refresh

The Terminal Doppler Weather Radar technical refresh mechanism funds needed upgrades to the TDWR system. Improvements included replacing the system processor, upgrades to scan tracking (to 360 degree vice sector scan) and Radar Product Generator, Backup Communications, Uninterruptible Power Supply (UPS), modifications to battery, and safety modifications for the antenna.

Terminal Doppler Weather Radar Service Life Extension Program

The Terminal Doppler Weather Radar Service Life Extension Program (TDWR SLEP) mechanism funds the service live extension efforts to continue operation of the TDWR system. Upgrades include new hardware and re-hosting software for the Digital Signal Processor (DSP), RDA (receiver replacement), replacing antenna motors and hardened elevation drive bullgear/bearings.

Weather System Processor

The Weather System Processor (WSP) provides precipitation, windshear, microburst, and precipitation data at 39 terminal areas that require wind shear coverage but do not warrant a Terminal Doppler Weather Radar. WSP generates weather products (microburst detection, gust front detection, wind shift prediction, and precipitation detection and tracking) derived from additional processing of Airport Surveillance Radar-9 (ASR-9) weather data.

Weather and Radar Processor (WARP) Replacement (key system)

The Weather and Radar Processor (WARP) will undergo a hardware and software upgrade to receive, process, display, and disseminate enhanced weather products (i.e., forecasts of thunderstorms)from a variety of sensors to provide tailored weather information to Traffic Managers on briefing terminals and ETMS (TFM-M), En route controllers (DSR), as well as gridded weather data to automation systems (e.g., URET, DOTS+, ATOP, CTAS/TMA/DA, etc). It will provide enhanced forecasting tools to CWSU meteorologists, and enhances weather support to oceanic operations with various forecasts of turbulence, volcanic ash plumes, and thunderstorms in gridded format. It also provides a telecommunications upgrade to support emerging FAA Telecommunications Infrastructure (FTI) services; incorporate enhanced computer security features and provide an organic maintenance capability.

People

AF Communication Specialist

AF Communication Specialists maintain communication systems for their area of responsibility. Their duties include troubleshooting failures, performing corrective maintenance, certifying systems are operational, and performing preventive maintenance.

Air Traffic Control Specialist

A person authorized to provide air traffic control services.

Airline Operations Center Dispatcher

The Airline Operations Center Dispatcher (AOC Dispatcher) is a major airline employee that enters bulk flight plan requests and works with FAA by revising schedules and providing flight cancellations based on FAA provided data (aggregate demand lists, arrival rates, and parameters for anticipated ground delays.)

Airway Facility Specialist

Airway Facilities specialists are responsible for the certification and maintenance of FAA systems in facilities. The number and types of specialists depend on the number of systems under AF's responsibility. The major categories of specialties for AF personnel include automation, radar, navigation, communication, telecommunications, and environmental. Due to the quantity and complexity of systems within a facility, specialists focus on well-defined and specific areas of responsibilities.

Local Controller

A Local Controller performs the following activities: Ensure separation; Control active runways; Initiate control instructions; Monitor and operate communications equipment; Utilize tower radar display(s); Utilize alphanumerics; Assist the tower associate controller with coordination; Scan tower cab environment; Ensure computer entries and strip marking are completed for instructions or clearances issued or received; Process and forward flight plan information; Perform any functions of the tower team which will assist in meeting situation objectives; Coordinate with ground control for safe and efficient use of runways and movement areas.

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Radar Controller

A Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate automated handoffs; Assist the radar associate controller with non-automated handoff actions when needed; Assist the radar associate controller in coordination when needed; Scan radar display; Correlate with flight progress strip information; Ensure computer entries are completed on instructions or clearances you issue or receive; Ensure strip marking is completed on instructions or clearances you issue or receive.

Interfaces

Aeronautical Information Management ⇐ (NAS Status Data) ⇒ System Wide Information Management Build 1B

"AIM exchanges NAS Status data, including equipment status, airspace schedules and status, contingency routings, and RNP-RNAV routings, with other systems via SWIM.

Aeronautical Information Management — (Weather Data) ⇒ System Wide Information Management Build 1B

AIM provides PIREPS for distribution to NAS users via SWIM.

Automatic Dependent Surveillance - Broadcast Avionics ← (Target Data) → Automatic Dependent Surveillance - Broadcast Avionics

Air-to-air ADS-B target data is exchanged between aircraft for use initially as a situation awareness enhancement. This capability will be expanded to other future applications, such as precision approach and landing and self separation.

Automatic Dependent Surveillance - Broadcast Avionics ← (Target Data) → BSGS Broadcast Services Ground Station

The GBT intercepts ADS-B transmissions from aircraft in the coverage area of the GBT. The GBT transmits ADS-B reports it receives down the UAT link back up the 1090 link and vice versa.

Automatic Dependent Surveillance - Broadcast Avionics — (Target Data) → Cockpit Display of Traffic Information Avionics

The ADS-B avionics provides the flight crew surveillance information about other aircraft in the area and is displayed on the CDTI. This information is initially used for enhanced situation awareness and will be expanded to other future applications such as precision approach and landing and self separation.

BSGS Broadcast Services Ground Station — (Weather Data) → Automatic Dependent Surveillance - Broadcast Avionics

ADS-B Avionics (with weather application) can receive FIS weather products broadcasted by the BSGS via an ADS-B data link.

BSGS Broadcast Services Ground Station — (Surveillance Data) → System Wide Information Management Build 1B

The GBT provides ADS-B reports to the SDN for distribution to automation systems and other authorized systems and user.

Integrated Terminal Weather System — (Weather Data) → Integrated Terminal Weather System

The Integrated Terminal Weather System NFU located in the ATCSCC provides site-specific MDCRS and Rapid Update Cycle (RUC) forecast data to the other ITWS Product Generators which provide tailored products to Towers and TRACONs in CONUS and Puerto Rico.

Integrated Terminal Weather System ← (Weather Data) → System Wide Information Management Build 1B

ITWS publishes and subscribes to weather data on SWIM.

System Wide Information Management Build 1B — (Flight Data) → BSGS Broadcast Services Ground Station

FOMS provides the flight object to the GBT for transmission to aircraft via SWIM.

System Wide Information Management Build 1B — (NAS Status Data) → BSGS Broadcast Services Ground Station

"The GBT receives NAS Status Data, including NOTAMS, via SWIM for broadcast to aircraft equipped with UAT communication equipment.

Weather and Radar Processor (WARP) Replacement — (Weather Data) → Integrated Terminal Weather System

The WARP (Tech Refresh) and ITWS exchanges weather products to help terminal controllers assist aircrews in avoiding hazardous weather and traffic managers for contingency planning.

Weather and Radar Processor (WARP) Replacement — (Weather Data) → System Wide Information Management Build 1B

WARP publishes weather data on SWIM.

Issues

1) Datalink via GBT, SWIM and the SMU are needed for this step. We will likely need interim interfaces between ITWS, WARP/GWIS, weather sensors, etc., and SWIM. 2) It is assumed that WARP/GWIS (and later GWP) will package the weather data that is sent to AIM via SWIM. Then AIM will package all FIS data (NAS Status and Weather Data) and transmit it via SWIM and GBT. 3) Agency policy vis-a-vis re provision of FIS services--FAA versus vendor--is not clear at this time and being revisited as earlier FAA policy established it to be vendor-provided service.

Service Group Air Traffic Services

Service ATC-Advisory

Capability Weather Advisories Capability

Operational Improvement

Enhance Meteorological Data Collection and Reporting System (MDCRS) (103116)

Additional atmospheric parameters (i.e., humidity and turbulence) become available from expanded airline fleet participation coupled with of additional parameters further improves the accuracy of weather forecast model output such as inflight icing and turbulence forecasts.

31-Dec-2007 to 01-Feb-2020

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

There needs to be additional airborne observations of atmospheric parameters to increase accuracy of weather forecast models. In particular, humidity sensors on aircraft will provide moisture profiles of the atmosphere, which will enhance accuracy of in-flight icing forecasts. The addition of turbulence algorithms to jetliner flight management systems will provide the National Weather Service a significantly larger set of accurate observations of current turbulence. This information is crucial to improving turbulence forecasts.

Benefits

More accurate in-flight icing forecasts increase safety.

Systems

Aeronautical Information Management (key system)

The AIM system represents the evolution of the acquisition, storage, processing and dissemination of aeronautical information in the NAS. Aeronautical information is defined as any information concerning the establishment, condition, or change in any component (facility, service, or procedure of, of hazard) of the National Airspace System. Aeronautical information comes in two types a somewhat static type, and a more dynamic type. The static portion represents the aeronautical information baseline as a particular date, while the dynamic portion updates particular aspects of the static portion due to system impacts or events. The Static portion represents data that NAS automation systems and other users use to adapt their software to properly operate. The dynamic portion represents information typically contained in NOTAMs that indicate short-term changes to the static data.

Many NAS systems support the acquisition, generation, and dissemination of the static aeronautical information. Information of this type includes airspace structures, airways, locations of NAS facilities, inter-facility letters of agreement and memorandums of understanding, obstructions, standard procedures, airspace charts, etc.

Several NAS systems also support the acquisition, generation, processing, and dissemination of the dynamic aeronautical information. Information of this type includes, facility outages, runway closures, temporary flight restrictions, airspace constraints, SIGMETs, etc. This information must be disseminated to users and providers of air traffic services in a timely and efficient manner.

AIM will provide the central point for the dissemination of high quality, configuration controlled information to NAS systems, service providers and users of the NAS. AIM will disseminate data based on the Aeronautical Information Exchange Model (AIXM) protocols.

Commercial Communications Service Provider (key system)

Commercial Communications Service Provider (CCSP) is a commercial entity who provides communications services for a fee.

Digital Voice Recorder System

Provides modern digital voice recording devices used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

In Feburary 2004, the DVRS was upgraded with a 24-channel card, which replaced the 16-channel card. This minor upgrade, called DVR II, was not extended to the systems installed prior to February 2004.

Enhanced Aircraft Weather Sensor (key system)

The enhanced aircraft weather sensor provides for the collection of real-time airborne weather data, including turbulence and humidity, from participating aircraft, and integrates the data with other weather products for MAS-wide distribution.

Power Systems

The Power Systems (Pwr Sys) mechanism provides for the conditioning of commercial power, including uninterruptible power systems (UPS), to eliminate voltage dropouts, surges, and voltage sags caused by sources outside the facility. Power distribution, grounding, bonding and shielding of electrical system within the facility is also part of the Pwr Sys.

The Power Systems (Pwr Sys) mechanism provides the following: 1.) ACEPS Busway Replacements, 2.) ACEPS EG Maintenance, 3.) ACEPS Monitoring & Diagnostics, 4.) ACEPS Fuel System Upgrade, 5.) ACEPS Training, 6.) Battery Monitoring, 7.) Training Facility, 8.) CPDS, 9.) Battery Replacements, 10.) DC Systems, 11.) EG, 12.) LPGBS, 13.) Power Cable, 14.) UPS, 15.) Contract Support.

People

Meteorologist

Meteorologists provide accurate and timely weather information for FAA facilities within their area of responsibility. They analyze and interpret real-time weather data from radar, satellites and pilot reports as well as NWS products such as terminal and area forecasts, and in-flight advisories.

Interfaces

no interfaces

Issues

Airline equipage of their fleet during economic slump.

Service Group Air Traffic Services

Service ATC-Advisory

Capability Weather Advisories Capability

Operational Improvement

Improve En Route Weather Products (103109)

Several systems and initiatives lead to improved weather products in the En Route domain, including the tri-agency Next Generation Weather Radar system, Meteorological Data Collection and Reporting System (MDCRS), Corridor Integrated Weather System (CIWS), and the Weather and Radar Processor (WARP) (and its successor--the Global Weather Information System). More jetliners become MDCRS equipped and humidity and turbulence reports added to that of winds and temperature, improving weather model forecast output. CIWS provides tailored thunderstorm products for traffic managers to mitigate thunderstorm impacts on the busy corridor from Chicago eastward, and also enhanced Echo Top mosaic and forecast, to facilitate over-the-top routing. The Global Weather Information System (GWIS) replaces the WARP and provides enhanced forecasting tools for the CWSU.

01-Sep-2011 to 01-Jan-2010

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Several systems and initiatives lead to improved weather products in the En Route domain. These include upgrades to the tri-agency Next Generation Weather Radar (NEXRAD), Meteorological Data Collection and Reporting System (MDCRS), Corridor Integrated Weather System (CIWS), aviation weather research, and emergence of the WARP successor--GWIS. Ongoing efforts by the FAA Aviation Weather Research Program (AWRP) enhance knowledge of atmospheric physics and significantly improve the accuracy of weather model forecasts. AWRP-funded research provides improved algorithms for insertion into NEXRAD, which enhances detection of aviation-impacting weather and new/emerging products in FAA weather processors. This improves tailored products for users. Also, AWRP efforts yield forecasts [from the aviation weather center (AWC)] of inflight icing, turbulence, and more accurate, longer lead time forecasts of thunderstorm position/movement to aid TM in planning. Improved weather information increases the effectiveness of TM and ATC to control and/or routet aircraft in an airspace constrained by hazardous weather, and also in providing more accurate and timely advisories to pilots. The FAA also receives improved products from NWS meteorologists (CWSU and NWS' weather forecast offices and Aviation Weather Center) that enhance support to en route operations.

Tri-agency NEXRAD Radar system Modernization of the NEXRAD entails open system upgrades to the functionality of the Radar Data Acquistion (RDA) to complement the upgrades to the NEXRAD radar product generator previously implemented. The RDA upgrade includes a dual polarimetric scanning capability that improves atmospheric sampling and better detection of aviation-impacting variables (e.g., snow, rain, icing condtions), which leads to enhanced in-flight icing forecasts. These upgrades also convert each of the 140+ NEXRAD radars to high-speed, digital communications resulting in enhanced products reaching FAA weather processors--WARP/GWIS, Integrated Terminal Weather Service (ITWS), Operational And Supportability Implementation system (OASIS), and CIWS--more quickly.

MDCRS Airlines significantly increase the number of their fleet aircraft providing in situ weather observations via MDCRS. Winds and temperatures are sent directly to the NWS and FAA (for ITWS). Humidity sensors have been added. Initial installation of turbulence algorithms, for evaluation, has been added to onboard flight management systems (FMS) to provide "AutoPIREPs (automated Pilot Reports) of turbulence encounters. When proven, turbulence algorithms are added to significantly more aircraft, providing additional data via MDCRS datastream that will yield a major improvement in detecting and understanding turbulence. This increased flow of airborne weather observations automatically updates NAS weather databases and enables data mining by NAS service providers, users, and even automation systems for rapid updates. This expanded set of atmospheric variables (from MDCRS) improves the performance of weather model, resulting in more accurate and operationally useful forecast products that depict in-flight icing, turbulence, and winds aloft (for controllers or volcanic ash plume dispersal models). The humidity sensor is important as it will enable weather models to be intialized with much denser profiles of atmospheric water vapor leading to improved inflight icing forecasting capability. Without these airborne observations, the Rapid Update Cycle (RUC) forecast model would only be available every 3 hours, rather than hourly as required by FAA automation systems such as User Request Evaluation Tool.

CIWS CIWS provides traffic managers at the Air Route Traffic Control System Command Center (ATCSCC), certain Air Route Traffic Control Centers (ARTCC) and Terminal Radar Approach Controls (TRACON), and large airports, with highly accurate 2-hour convective forecasts and will provide significantly more accurate 4-hour forecasts in busiest NAS corridors and associated airports by 2015. The ultimate goal is accurate convective forecasts out to 8 hours. The integration of CIWS with capacity-enhancing tools (e.g., Route Availability Planning Tool) yields an invaluable planning aid to traffic managers at various facilities. CIWS incorporates radar data from NEXRAD, Terminal Doppler Weather Radar (TDWR), ARSR-4, and Airport Surveillance Radar (ASR-9), plus RUC weather model forecasts, satellite, and lightning data. Another set of CIWS products, an Echo Top (ET) mosaic forecast, enables over-the-top routing. Traffic Flow Management will benefit from CIWS products, especially since the longer-range forecasts will aid in strategic planning. Although the demonstration CIWS will continue for a number of years to resolve human-machine interface issues as longer forecasts become available for multiple users, the operational capability will be added to the GWIS. Adding the CIWS capability to GWIS will not only provide more accurate radar mosaics to the DSR, but also leverage the existing infrastructure of GWIS for product dissemination/display to traffic managers within the ARTCC, and at corridor-related facilities (e.g., ATCSCC, TRACONs, and large airports), as well as dispatchers. GWIS GWIS provides weather information to various users and systems, including traffic managers, en route controllers, the CWSU weather team, automation systems, and Enhanced Traffic Management System (TFM-M). GWIS enhances collaborative decisionmaking by developing more accurate, aviation-impacting weather products available to traffic managers, controllers, pilots, and airline dispatchers, which enables better decisionmaking regarding hazardous weather planning, avoidance, and rerouting.

Aviation Weather Research Required forecast products for in-flight icing, turbulence, and convective activity emerge from weather research. Requirements which are not yet within the state of the science to solve, enter into respective areas (icing, turbulence, etc) of weather R&D for development. Once developed, the AWC provides the products in a gridded format to the NAS via a NWS-to-FAA telecommunications gateway leading to GWIS and ITWS, for subsequent display to controllers and traffic managers. In addtion, these products are forwarded to both en route/terminal automation systems that assist in the decision making process.

Benefits

Improved weather products increase the predictability of weather; this improves safety- and efficiency-related decisions. The improved weather predictions increase access to non-impacted airspace and minimize re-routing around hazardous weather, saving fuel and time.

Systems

Aeronautical Information Management (key system)

The AIM system represents the evolution of the acquisition, storage, processing and dissemination of aeronautical information in the NAS. Aeronautical information is defined as any information concerning the establishment, condition, or change in any component (facility, service, or procedure of, of hazard) of the National Airspace System. Aeronautical information comes in two types a somewhat static type, and a more dynamic type. The static portion represents the aeronautical information baseline as a particular date, while the dynamic portion updates particular aspects of the static portion due to system impacts or events. The Static portion represents data that NAS automation systems and other users use to adapt their software to properly operate. The dynamic portion represents information typically contained in NOTAMs that indicate short-term changes to the static data.

Many NAS systems support the acquisition, generation, and dissemination of the static aeronautical information. Information of this type includes airspace structures, airways, locations of NAS facilities, inter-facility letters of agreement and memorandums of understanding, obstructions, standard procedures, airspace charts, etc.

Several NAS systems also support the acquisition, generation, processing, and dissemination of the dynamic aeronautical information. Information of this type includes, facility outages, runway closures, temporary flight restrictions, airspace constraints, SIGMETs, etc. This information must be disseminated to users and providers of air traffic services in a timely and efficient manner.

AIM will provide the central point for the dissemination of high quality, configuration controlled information to NAS systems, service providers and users of the NAS. AIM will disseminate data based on the Aeronautical Information Exchange Model (AIXM) protocols.

Air Route Surveillance Radar - Model 3 (key system)

The Air Route Surveillance Radar - Model 3 (ARSR-3) is a 1980s radar that provides primary long range surveillance data, including slant range and azimuth data. It processes the returns which includes demodulation, analog-to-digital conversion, moving target indicator function, sensitivity time control, range and azimuth gating, and digital target extraction - all of which are performed digitally (with the exception of the demodulation and analog-to-digital conversion). In addition, the ARSR-3 has a weather channel with associated processing to provide weather contour information in digital format.

Air Route Surveillance Radar - Model 4 (key system)

The Air Route Surveillance Radar - Model 4 (ARSR-4) is a three-dimensional, long-range, rotating phased array, primary surveillance radar with integrated height finder capability. It is part of the joint surveillance system (JSS) used in conjunction with ARSR-3 coverage as part of the nationwide air defense command surveillance network. In addition to functions peculiar to the military, the ARSR-4 performs the same basic functions of the ARSR-3, by providing primary long-range surveillance data, including slant range and azimuth data.

Automated Surface Observing System Pre-Planned Product Improvement (key system)

The Automated Surface Observing System P3I will improve the automated sensors performance. These include an ASOS processor upgrade, improved dew point sensor, ice-free wind sensor, enhanced precipitation identifier, and a 25,000-foot ceilometer.

Commercial Communications Service Provider (key system)

Commercial Communications Service Provider (CCSP) is a commercial entity who provides communications services for a fee.

Communications Management System (key system)

The CMS Management and Control function performs tasks for overall management and control of all air/ground and ground/ground voice and data communications to support System Wide Information Management (SWIM). CMS will also incorporate a reconfiguration control function to support reconfigurable airspace assignments, data routing, and a digital recording for both voice and data.

The En Route Automation Modernization program has assumed the data recording function via the Standard Automation Platform, and the Digital Voice Recorder System performs the voice recording function. The CMS routing function is a data router that ensures transport of data communications among Air Traffic Control facilities and users of SWIM. Additionally, CMS integrates functionalities inherently provided by the voice switches, the voice recorders, and the ATN Router.

Corridor Integrated Weather System (key system)

The CIWS collects various data, then processes, generates, displays, and distributes convective (thunderstorm) weather products to traffic managers at ATCSCC, certain ARTCCs and large TRACONs, and some large airports. The CIWS receives weather data from multiple sensors (primarily radars) and distributes processed thunderstorm information to NAS traffic managers via the System Wide Information Management (SWIM). This system will consist of a hardware processor and associated displays to be used in the TRACON, ARTCC, and ATCSCC.

Digital Voice Recorder System

Provides modern digital voice recording devices used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

In Feburary 2004, the DVRS was upgraded with a 24-channel card, which replaced the 16-channel card. This minor upgrade, called DVR II, was not extended to the systems installed prior to February 2004.

Digital Voice Recorder System Replacement

The Digital Voice Recorder System Replacement (DVRS Replacement) is a modern digital system used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

Enhanced Aircraft Weather Sensor (key system)

The enhanced aircraft weather sensor provides for the collection of real-time airborne weather data, including turbulence and humidity, from participating aircraft, and integrates the data with other weather products for MAS-wide distribution.

Flight Information System - Data Link (key system)

The Flight Information System - Data Link (FISDL) provides Pilots weather, NOTAM, airfield information and other selected data through a service vendor operating on FAA provided VHF channels. The FISDL service is being facilitated through a FAA/Industry agreement allowing a commercial service provider to offer graphical and textual FIS/weather products to the cockpit of equipped aircraft. This vendor operated service is being provided as a near-term capability consistent with the FAA FIS Policy Statement of 1998. This vendor operated service will be phased out when the FAA is able to offer simliar FISDL services through FAA operated data link resources (e.g., via the UAT link using the BSGS and TIS-FIS Broadcast Server mechanism).

Integrated Terminal Weather System (key system)

The Integrated Terminal Weather System (ITWS) functions as a weather server in the terminal domain. It acquires data from FAA and National Weather Service (NWS) sensors as well as from aircraft in flight in the terminal area. The ITWS will provide aviation-oriented weather products to Air Traffic Control (ATC) personnel that are immediately usable without further meteorological interpretation.

National Weather Service Workstation (key system)

The National Weather Service Workstation (NWS Workstation) enables the Meteorologist to create and disseminate aviation-related weather products (e.g., SIGnificant METeorological Information (SIGMETS), Terminal Aerodrome Forecasts (TAF), etc.) to the FAA and nearby NWS Weather Forecast Offices. The NWS uses various methods to disseminate these products (e.g., Commercial Communications Service Provider (CCSP), internet, NWS-to-FAA telecommunications gateways, etc) to the FAA.

Next Generation Weather Radar (key system)

The Next Generation Weather Radar (NEXRAD) system is a tri-agency (FAA, DoD, & NWS) Doppler weather radar to identify and track heavy precipitation and thunderstorm attribute information such as high wind velocity, hail, tornado, wind shear, precipitation intensity, and echo tops products. Mosaics of multiple NEXRADs are provided to FAA controllers on DSR (from WARP) and to DoD controllers on MicroEARTS (where they control aircraft NAS airspace). NEXRAD mosaics are also sent to traffic managers. Commercial weather vendors also recieve NEXRAD products.

Next Generation Weather Radar Open System (key system)

The Next Generation Weather Radar Open System (NEXRAD Open System) mechanism will upgrade the NEXRAD to an open systems architecture with new hardware, software, and modular configuration. The upgrade will initially increase the radar""'s processing capabilities. Subsequent upgrades to the actual radar will reflect radar control via software that enables quicker, tailored scans resulting in more accurate products and improvement to overall system reliability and maintainability.

Operational and Supportability Implementation System (key system)

Operational and Supportability Implementation System (OASIS): The capabilities provided by the OASIS include alphanumeric and graphic weather product acquisition and display, flight plan processing, search and rescue services, and law enforcement support. The OASIS provides a real-time, multi-user, computer-based system that provides current weather information, forecast weather information, Notice to Airmen (NOTAM) information, and flight planning.

OASIS also supports flight service specialists at International Automated Flight Service Stations (IAFSS) that provide services associated with aircraft transiting the oceans.

Power Systems

The Power Systems (Pwr Sys) mechanism provides for the conditioning of commercial power, including uninterruptible power systems (UPS), to eliminate voltage dropouts, surges, and voltage sags caused by sources outside the facility. Power distribution, grounding, bonding and shielding of electrical system within the facility is also part of the Pwr Sys.

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System Wide Information Management Build 1B (key system)

Build 1B provides all items in 1A, including more NAS information. This build integrates Flight and Surveillance Information systems into the SWIM architecture.

Terminal Doppler Weather Radar - Technical Refresh

The Terminal Doppler Weather Radar technical refresh mechanism funds needed upgrades to the TDWR system. Improvements included replacing the system processor, upgrades to scan tracking (to 360 degree vice sector scan) and Radar Product Generator, Backup Communications, Uninterruptible Power Supply (UPS), modifications to battery, and safety modifications for the antenna.

Terminal Doppler Weather Radar Service Life Extension Program

The Terminal Doppler Weather Radar Service Life Extension Program (TDWR SLEP) mechanism funds the service live extension efforts to continue operation of the TDWR system. Upgrades include new hardware and re-hosting software for the Digital Signal Processor (DSP), RDA (receiver replacement), replacing antenna motors and hardened elevation drive bullgear/bearings.

Weather Message Switching Center Replacement (WMSCR) Sustain (key system)

The Weather Message Switching Center Replacement (WMSCR) sustainment activity will sustain the existing WMSCR functionality of distributing alphanumeric weather text and NOTAM products through a hardware and software upgrade program. This upgrade program will consist of Commercial-off-the-Shelf processors, physical disk drives, workstations, network routers, printer, operating system, High Order Language programming software, and other commercially available software packages.

Weather Systems Processor (Technological Refresh) (key system)

The Weather Systems Processor (Technological Refresh) (WSP (Tech Refresh)) is a technological refresh of Commercial off-the-Shelf (COTS) equipment procured under the original Airport Surveillance Radar-Weather Systems Processor (ASR-WSP) program. WSP COTS equipment refresh cycle is expected every six (6) to seven (7) years to maintain operational condition of equipment.

Weather and Radar Processor (Weather and Radar Processor) Stage 3 (key system)

The Weather and Radar Processor (WARP) Stage 3 provides gridded forecast weather data via the Weather Information Network System (WINS) to User Request Evaluation Tool Core Capability Limited Deployment (URET/CCLD), Enhanced Traffic Management System (ETMS), Dynamic Ocean Tracking System - Plus (DOTS-Plus), Advanced Technologies and Oceanic Procedures (ATOP), and Operational and Supportability Implementation System (OASIS).

Support Activities

AF Procedure Development for Improved En Route Weather Products

Airway Facilities procedures document the way airway facility operations are to be executed. The introduction of new systems, or changes to existing systems results in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

AF Training for Improved En Route Weather Products

Airway Facilities (AF) training is provided to AF workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AF Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

AT Procedure Development for Improved En Route Weather Products

Air Traffic Procedures document air traffic services and how they are implemented. The introduction of new systems, or changes to existing systems, may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

AT Training for Improved En Route Weather Products

Air Traffic (AT) training is provided to the AT workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AT Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

FAA Adaptation for Improved En Route Weather Products

Many NAS systems incorporate parameters that are adjustable. This allows for the setting of system parameters to optimize performance at each particular site. When new systems that have adjustable parameters are introduced into the NAS, adaptation data must be developed for the system. Environmental and procedural changes may also result in the need to modify FAA Adaptation Data. Generally, adaptation will begin 12 months before IOC and continue until 12 months after IOC.

FAA Certification for Improved En Route Weather Products

FAA certification is an activity necessary to support people and systems in the delivery of NAS services. Avionics and associated systems are deemed to be critical to the safety of flight and must be certificated. In addition certain operators and service providers require to be certified such as pilots, dispatchers and others. Certification will generally begin 24 months prior to Initial Operating Capability, and be complete prior to receiving or giving service.

People

Air Traffic Control Specialist

A person authorized to provide air traffic control services.

Airline Operations Center Dispatcher

The Airline Operations Center Dispatcher (AOC Dispatcher) is a major airline employee that enters bulk flight plan requests and works with FAA by revising schedules and providing flight cancellations based on FAA provided data (aggregate demand lists, arrival rates, and parameters for anticipated ground delays.)

En Route Advisory Service Position

An En Route Advisory Service Position performs the following activities: Provide en route aircraft with weather data tailored to a specific altitude and route using the most current available sources of aviation meteorological information.

Flight Certification Specialist

Flight Certification Specialists support aircraft and aircraft component certification, continued airworthiness monitoring and inspection, and new or revised flight regulations that change operating procedures.

Flight Service Specialist

A Flight Service Specialist performs the following activities:

* Provide services to aircraft in flight and during the pre-flight phase,

* Monitoring and restoration of NAVAID; Issuing local airport advisories,

* Relaying ATC clearances, advisories or requests,

* Issuing military flight advisory messages,

* Receiving and issuing NOTAMS,

* Assisting is search and rescue communication searches,

* Activating and closing flight plans,

* Making unscheduled broadcasts,

* Soliciting and issuing PIREPS,

* Presenting pilot weather briefings to airborne aircraft,

* Locating lost aircraft,

* Recording aircraft contacts,

* Providing weather advisories and flight plan services,

* Providing hazardous area reporting services, and

* Keeping airmen and weather information current.

Meteorologist

Meteorologists provide accurate and timely weather information for FAA facilities within their area of responsibility. They analyze and interpret real-time weather data from radar, satellites and pilot reports as well as NWS products such as terminal and area forecasts, and in-flight advisories.

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Radar Controller

A Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate automated handoffs; Assist the radar associate controller with non-automated handoff actions when needed; Assist the radar associate controller in coordination when needed; Scan radar display; Correlate with flight progress strip information; Ensure computer entries are completed on instructions or clearances you issue or receive; Ensure strip marking is completed on instructions or clearances you issue or receive.

Traffic Management Coordinators

Traffic Management Coordinators track and predict traffic flows, analyze ground delays, evaluate alternative routing strategies, and plan local traffic patterns at the local facility (ARTCC, TRACON, or Towers)

Traffic Management Specialist

Traffic Management Specialists perform the following activities: Balance air traffic demand with the airspace's capacity to maintain maximum and efficient utilization of the NAS; Coordinate and implement traffic management directives if needed for area of responsibility; Monitor and balance traffic flows within the area of responsibility in accordance with traffic management directives; Evaluate effectiveness of traffic management directives and make necessary adjustments; Document delay information.

Interfaces

Aeronautical Information Management ← (NAS Status Data) → System Wide Information Management Build 1B

"AIM exchanges NAS Status data, including equipment status, airspace schedules and status, contingency routings, and RNP-RNAV routings, with other systems via SWIM.

Aeronautical Information Management — (Weather Data) → System Wide Information Management Build 1B

AIM provides PIREPS for distribution to NAS users via SWIM.

Air Route Surveillance Radar - Model 4 — (Surveillance Data) → System Wide Information Management Build 1B

The ARSR-4 provides surveillance data to SWIM for distribution to automation systems and other authorized systems and users.

Air Route Surveillance Radar - Model 4 — (Weather Data) → System Wide Information Management Build 1B

The ARSR long-range radar provides detected weather data to SWIM for distribution.

Automated Surface Observing System Pre-Planned Product Improvement — (Weather Data) → Weather Message Switching Center Replacement (WMSCR) Sustain

This interface supplies surface observation data (e.g., wind, temperature, visibility, and precipitation) to Weather Message Switching Center Replacement (WMSCR).

Automated Surface Observing System Pre-Planned Product Improvement — (Weather Data) → Weather Systems Processor (Technological Refresh)

The ASOS sends wind speed/direction and wind gust data to the WSP.

Communications Management System ← (Data Communication) → Communications Management System

Controllers in the same or different facilities communicate via CMS.

Communications Management System ← (Voice Communication) → Communications Management System

Controllers in the same or different facilities communicate via CMS.

Integrated Terminal Weather System — (Weather Data) → Integrated Terminal Weather System

The Integrated Terminal Weather System NFU located in the ATCSCC provides site-specific MDCRS and Rapid Update Cycle (RUC) forecast data to the other ITWS Product Generators which provide tailored products to Towers and TRACONs in CONUS and Puerto Rico.

Integrated Terminal Weather System ← (Weather Data) → System Wide Information Management Build 1B

ITWS publishes and subscribes to weather data on SWIM.

Next Generation Weather Radar ← (Weather Data) → Integrated Terminal Weather System

NEXRAD provides numerous products to ITWS to enable it to generate high- resolution, 4-D products to send to various users and automation systems such as CTAS/aFAST. These products include precipitation (intensity level) product with Anomalous Propagation (false weather radar returns) removed, hail, and tornado products, and status messages from the individual WSR-88D radar sites. The ITWS continually receives a specific subset of WSR-88D products via a predefined routine product set list, plus ITWS may request and receive other WSR-88D radar products as needed.

Next Generation Weather Radar — (Weather Data) → System Wide Information Management Build 1B

NEXRAD publishes weather data on SWIM.

Next Generation Weather Radar — (Weather Data) → Weather and Radar Processor (Weather and Radar Processor) Stage 3

WARP receives Doppler enhanced weather radar product (e.g., precipitation intensity, hail, tornado, etc) and status messages from individual NEXRAD sites recently upgraded due tri-agency Open Systems modernization effort.

Next Generation Weather Radar Open System — (Weather Data) → Corridor Integrated Weather System

NEXRAD provides radar base data (not products) to CIWS.

Next Generation Weather Radar Open System — (Weather Data) → System Wide Information Management Build 1B

NEXRAD publishes weather data on SWIM.

Next Generation Weather Radar Open System — (Weather Data) → Weather and Radar Processor (Weather and Radar Processor) Stage 3

The NEXRAD (Mod Open System, upgrades the processing and dissemenation abilities to provide higher resolution radar products to WARP, as well as FAA-tailored products. Later Mods upgrade the radar to provide enhanced precip identification/precip type (e.g., freezing rain, snow, etc) via dual polar beam formation.

System Wide Information Management Build 1B — (Data Communication) → Communications Management System

Pilots can access data available on SWIM via radios and CMS.

System Wide Information Management Build 1B — (Weather Data) → Operational and Supportability Implementation System

OASIS subscribes to weather data on SWIM.

Weather Message Switching Center Replacement (WMSCR) Sustain ← (Weather Data) → Operational and Supportability Implementation System

The WMSCR provides NOTAMS and alphanumeric weather products to OASIS.

Weather Message Switching Center Replacement (WMSCR) Sustain — (Weather Data) → System Wide Information Management Build 1B

WMSCR publishes weather data on SWIM.

Weather Systems Processor (Technological Refresh) — (Weather Data) → System Wide Information Management Build 1B

WSP publishes weather data on SWIM.

Issues

The World Meteorological Organization has implemented a new weather message communication format (GRIB2), which will be used on both Model data and MDCRS data. Currently, all NAS systems use GRIB1 format. By the mandatory date (TBD), there will be a switch to GRIB2, and the following systems must have had a minor software update: WARP/GWIS, CIWS, OASIS, ETMS, CTAS subsystems, URET Core Capability Limited Development (CCLD), OASIS, and ITWS.

Service Group Air Traffic Services
Service ATC-Advisory

Operational Improvement

Improve Oceanic Weather Products (103115)

Various products tailored for transoceanic flights, such as convection, volcanic ash, in-flight icing, clear air turbulence, and convection-induced turbulence, emerge from FAA-sponsored research and development. Better data link technology using ground- and satellite-based dissemination architectures speeds delivery, which enables common situation awareness (by oceanic control, airline operation center, (AOC) dispatcher, and flight deck) of the hazard along the flight path transition areas.

30-Jan-2008 to 31-Jan-2023

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Various products tailored to mitigate the transoceanic flight hazards, such as convection, volcanic ash, in-flight icing, clear air turbulence, and convection-induced turbulence, emerge from FAA-sponsored weather research and development (R&D). Space- and ground-based sensor information is integrated to provide more accurate weather data, which in turn leads to better forecasts of these hazards. Integrating lightning data (in-cloud and cloud-to-surface) into oceanic thunderstorm products enhance their reliability and accuracy and provide a true depiction of convection location. Often, oceanic thunderstorm activity is not visible to satellite imagery, as higher-level clouds obscure its detection. In such instances, lightning data serves as a surrogate for detecting convection in data-sparse oceanic regions. Volcanic ash, dispersed by winds aloft, poses a serious aviation hazard. Line offices of the National Oceanic and Atmospheric Administration (NWS and NESDIS) work together to provide satellite information to the FAA and Airline Operations Centers (AOC), relating the location of volcanic ash plumes with periodic updates. The National Environmental Satellite, Data, and Information Service (NESDIS) detects and tracks the plume via satellite, while the NWS depicts the plume forecast positions to FAA facilities and AOCs.

Other oceanic products (detection and forecast) include in-flight icing and turbulence products that emerge from aviation weather R&D and are sent to the Air Traffic Control Systems Command Center, oceanic Air Route Traffic Control Centers, and AOC dispatchers to facilitate preflight route planning and avoidance for en route aircraft. Automation systems (e.g., Advanced Technologies and Oceanic Procedures, Dynamic Oceanic Track System Plus), and the Operation and Supportability Implementation System will use these products (in gridded format) to aid in the decisionmaking process. The Federal Aviation Regulations require airline dispatchers to route aircraft away from hazardous weather.

Benefits

Improved weather products increase predictability of weather, which improves safety- and efficiency-related decisions. The improved weather predictions increase access to non-impacted airspace.

Systems

Advanced Technologies and Oceanic Procedures (key system)

Advanced Technologies and Oceanic Procedures (ATOP) is a Non-Developmental Item (NDI) automation, communications, training, maintenance, installation, transition, and procedures development support acquisition. It will provide a Flight Data Processing (FDP) capability fully integrated with Surveillance Data Processing (SDP). The SDP will be capable of processing primary and secondary radar, Automatic Dependent Surveillance (ADS, both Addressable: ADS-A and Broadcast: ADS-B), Controller Pilot Data Link Communications (CPDLC) position reports, and relayed High Frequency (HF) radio voice pilot position reports from an HF radio operator employed by a communications service provider under contract to the FAA. ATOP will support radar and non-radar procedural separation, tracking clearances issued via CPDLC or messages through the HF radio service provider, conflict detection/prediction capabilities through the use of controller tools (Conflict Alert and Minimum Safe Altitude Warning for radar airspace and Conflict Probe for non-radar procedural separation applications), and fully automated coordination via Air traffic services Inter-facility Data Communications System (AIDCS) with AIDCS equipped adjacent Flight Information Regions (FIRs) . The ATOP inter-facility data communications system will be capable of supporting the ICAO air traffic services message set. ATOP supports operations in which the information and primary capabilities required for the controller to maintain situational awareness and provide procedural separation services are available on the display (rather than paper flight strips).

Aeronautical Information Management (key system)

The AIM system represents the evolution of the acquisition, storage, processing and dissemination of aeronautical information in the NAS. Aeronautical information is defined as any information concerning the establishment, condition, or change in any component (facility, service, or procedure of, of hazard) of the National Airspace System. Aeronautical information comes in two types a somewhat static type, and a more dynamic type. The static portion represents the aeronautical information baseline as a particular date, while the dynamic portion updates particular aspects of the static portion due to system impacts or events. The Static portion represents data that NAS automation systems and other users use to adapt their software to properly operate. The dynamic portion represents information typically contained in NOTAMs that indicate short-term changes to the static data.

Many NAS systems support the acquisition, generation, and dissemination of the static aeronautical information. Information of this type includes airspace structures, airways, locations of NAS facilities, inter-facility letters of agreement and memorandums of understanding, obstructions, standard procedures, airspace charts, etc.

Several NAS systems also support the acquisition, generation, processing, and dissemination of the dynamic aeronautical information. Information of this type includes, facility outages, runway closures, temporary flight restrictions, airspace constraints, SIGMETs, etc. This information must be disseminated to users and providers of air traffic services in a timely and efficient manner.

AIM will provide the central point for the dissemination of high quality, configuration controlled information to NAS systems, service providers and users of the NAS. AIM will disseminate data based on the Aeronautical Information Exchange Model (AIXM) protocols.

Digital Voice Recorder System

Provides modern digital voice recording devices used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

In Feburary 2004, the DVRS was upgraded with a 24-channel card, which replaced the 16-channel card. This minor upgrade, called DVR II, was not extended to the systems installed prior to February 2004.

Digital Voice Recorder System Replacement

The Digital Voice Recorder System Replacement (DVRS Replacement) is a modern digital system used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

Dynamic Ocean Tracking System Plus (key system)

The Dynamic Ocean Tracking System Plus (DOTS Plus) automation system is located in each of the three Oceanic ARTCCs (Anchorage, Oakland, and New York) and in the ATCSCC. DOTS permits airlines to save fuel by flying random routes, in contrast to structured routes, and permit the air traffic controller to achieve lateral spacing requirements more efficiently. DOTS generates flexible oceanic tracks that are optimized for best airspace utilization and best time/fuel efficiency. Flexible tracks are updated twice a day using forecast winds aloft and separation (vertical and lateral) requirements. The DOTS oceanic traffic display gives a visual presentation of tracks and weather. DOTS sends traffic advisories and track advisories to users and receives aircraft progress reports from the commercial communications service providers. These external data exchanges are achieved through interfaces with the National Airspace Data Interchange Network (NADIN) Packet Switch Network (PSN) for Position Reports, Air Traffic Management (ATM) messages, Pilot Reports (PIREPS), and the Anchorage FDP2000. An interface to the Enhanced Traffic Flow Management System (ETMS) will improve coordination between the oceanic and domestic Traffic Flow Management (TFM) systems/activities. The DOTS Weather Server, installed at the Air Traffic Control System Command Center (ATCSCC), receives National Weather Service (NWS) wind and temperature data via the WARP/WINS system. The weather data is then distributed to the ARTCCs via commercially provided Integrated Services Digital Network (ISDN) telephone lines. DOTS Plus supports separation reduction initiatives as stipulated in RNP-10 (Required Navigation Performance) for decreasing lateral separation from 100 nautical miles to 50 nautical miles.

Future Air Navigation System 1/A (key system)

The Future Air Navigation System (FANS) is based on the International Civil Aviation Organization□s (ICAO) concept of a phased approach to implementing a modern, satellite-based, global Communication, Navigation, Surveillance/ Air Traffic Management (CNS/ATM) system. The following aircraft avionics are required to support an initial FANS implementation. These functions are referred to as FANS-1; the French developed equivalent for the Airbus A-330/340 is called FANS-A: Automatic Dependent Surveillance (ADS), ATC Data link, Airline Operational Control Data Link, Global Positioning System (GPS.

The FANS operational environment extends beyond the aircraft to include satellite, ground-based receiver/transmit stations, and a controller/pilot datalink system.

FANS 1/A consists of three message applications: AFN (ATS Facility Notification for logon to ATC via data link), ADS (Automatic Dependent Surveillance), CPDLC (Controller Pilot Data Link Communications). FANS 1/A uses the existing ACARS air/ground network to carry data link messages to/from the aircraft.

FANS 1 (Boeing implementation) was first certified in June of 1995 for use in the South Pacific. Oakland, Fiji, Aukland, and Brisbane FIRs were the initial participants for CPDLC using Inmarsat satcom. The latter three FIRs also used ADS for surveillance.

"The OEP identifies the ATOP program for implementation of FANS 1/A in Oakland, Anchorage and NY FIRs beginning in 2003." There are approximately 1000 FANS 1/A equipped aircraft in service as of mid-2002. All long-range model commercial transport aircraft have FANS 1 or FANS A either as standard equipment or as an option. In oceanic and remote areas, where FANS 1/A is currently in use, the Inmarsat geosynchronous satellite constellation provides the air/ground data link. HF data link will undergo trials as a FANS 1/A air/ground data link in late 2002-2003.

Operational and Supportability Implementation System (key system)

Operational and Supportability Implementation System (OASIS): The capabilities provided by the OASIS include alphanumeric and graphic weather product acquisition and display, flight plan processing, search and rescue services, and law enforcement support. The OASIS provides a real-time, multi-user, computer-based system that provides current weather information, forecast weather information, Notice to Airmen (NOTAM) information, and flight planning.

OASIS also supports flight service specialists at International Automated Flight Service Stations (IAFSS) that provide services associated with aircraft transiting the oceans.

Power Systems

The Power Systems (Pwr Sys) mechanism provides for the conditioning of commercial power, including uninterruptible power systems (UPS), to eliminate voltage dropouts, surges, and voltage sags caused by sources outside the facility. Power distribution, grounding, bonding and shielding of electrical system within the facility is also part of the Pwr Sys.

The Power Systems (Pwr Sys) mechanism provides the following: 1.) ACEPS Busway Replacements, 2.) ACEPS EG Maintenance, 3.) ACEPS Monitoring & Diagnostics, 4.) ACEPS Fuel System Upgrade, 5.) ACEPS Training, 6.) Battery Monitoring, 7.) Training Facility, 8.) CPDS, 9.) Battery Replacements, 10.) DC Systems, 11.) EG, 12.) LPGBS, 13.) Power Cable, 14.) UPS, 15.) Contract Support.

Weather and Radar Processor (WARP) Replacement (key system)

The Weather and Radar Processor (WARP) will undergo a hardware and software upgrade to receive, process, display, and disseminate enhanced weather products (i.e., forecasts of thunderstorms)from a variety of sensors to provide tailored weather information to Traffic Managers on briefing terminals and ETMS (TFM-M), En route controllers (DSR), as well as gridded weather data to automation systems (e.g., URET, DOTS+, ATOP, CTAS/TMA/DA, etc). It will provide enhanced forecasting tools to CWSU meteorologists, and enhances weather support to oceanic operations with various forecasts of turbulence, volcanic ash plumes, and thunderstorms in gridded format. It also provides a telecommunications upgrade to support emerging FAA Telecommunications Infrastructure (FTI) services; incorporate enhanced computer security features and provide an organic maintenance capability.

Support Activities

AF Training for Improved Oceanic Weather Products

Airway Facilities (AF) training is provided to AF workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AF Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

AT Training for Improved Oceanic Weather Products

Air Traffic (AT) training is provided to the AT workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AT Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

FAA Adaptation for Improved Oceanic Weather Products

Many NAS systems incorporate parameters that are adjustable. This allows for the setting of system parameters to optimize performance at each particular site. When new systems that have adjustable parameters are introduced into the NAS, adaptation data must be developed for the system. Environmental and procedural changes may also result in the need to modify FAA Adaptation Data. Generally, adaptation will begin 12 months before IOC and continue until 12 months after IOC.

Non-FAA Certification for Improved Oceanic Weather Products

FAA standards are applied to user activities necessary to support people and systems in the delivery of NAS services. Aviation avionics and equipment is deemed to be critical to the safety of flight and must be certificated. It is also necessary to certify aviation personnel compliance with these standards. Certification will generally begin 24 months prior to Initial Operating Capability, and be complete prior to receiving service.

Non-FAA Pilot Training for Improved Oceanic Weather Products

Non-FAA Pilot Training is provided to educate pilots as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional pilot training. Training will generally begin 60 days prior to IOC and be complete within one year following Full Operating Capability.

Non-FAA Training for Improved Oceanic Weather Products

Non-FAA Training is provided to educate users and their workforces as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional pilot training. Training will generally begin 60 days prior to IOC and be complete within one year following Full Operating Capability.

People

Airline Operations Center Dispatcher

The Airline Operations Center Dispatcher (AOC Dispatcher) is a major airline employee that enters bulk flight plan requests and works with FAA by revising schedules and providing flight cancellations based on FAA provided data (aggregate demand lists, arrival rates, and parameters for anticipated ground delays.)

Meteorologist

Meteorologists provide accurate and timely weather information for FAA facilities within their area of responsibility. They analyze and interpret real-time weather data from radar, satellites and pilot reports as well as NWS products such as terminal and area forecasts, and in-flight advisories.

Non-Radar Controller

A Non-Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate transfer of control, communications, and flight data; Ensure computer entries are completed on instructions or clearances issued or received; Ensure strip marking is completed on instructions or clearances issued or received.

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Interfaces

Dynamic Ocean Tracking System Plus — (Flight Data) → Dynamic Ocean Tracking System Plus

The DOTS + exchanges flight data.

Dynamic Ocean Tracking System Plus — (Target Data) → Dynamic Ocean Tracking System Plus

The DOTS + exchanges position reports.

Weather and Radar Processor (WARP) Replacement — (Weather Data) → Advanced Technologies and Oceanic Procedures

This interface provides the WARP (Tech Refresh) with the capability to provide gridded weather data gridded (AVN model) wind/temperature data and convective weather data via Weather Information Network System (WINS) to the Advanced Technologies and Oceanic Procedures (ATOP). ATOP will be used to support operations in which weather information will enhance the controller's situational awareness.

Weather and Radar Processor (WARP) Replacement — (Weather Data) → Dynamic Ocean Tracking System Plus

The WARP (Tech Refresh) provides finer-resolution winds aloft and temperature gridded forecast products to the DOTS Plus to improve the oceanic traffic management function. This interface will be accomplished via 10/100 Base-T LAN technology.

Weather and Radar Processor (WARP) Replacement — (Weather Data) → Operational and Supportability Implementation System

This upgrade enables WARP to provide the Operational and Supportability Implementation System (OASIS) with weather data (alphanumeric and graphic weather products). This will aid the Flight Service Specialist in flight planning services to the user.

Issues

· Reliance on NOAA (NESDIS and NWS) for volcanic ash product · There are a few SWIM/data link requirements allocated to this step (27, 671, 701) that should probably be allocated to 103115 which deals with data link and common weather picture.

Service Group Air Traffic Services
Service ATC-Advisory
Capability Weather Advisories Capability
Operational Improvement

Improve Terminal Weather Products (103113)

Several systems and initiatives lead to improved ATC Advisory - Weather services in the terminal domain including the Automated Surface Observing System (ASOS) Ice-free Wind sensor, the ASOS Enhanced Precip ID sensor, and Weather Support to Ground Deicing Decision Making (WSDDM). Other terminal-area products and systems include wake vortex mitigation, ASOS Snow Depth sensor, ASOS 25-Kft Ceilometer, Integrated Terminal Weather System (ITWS) deployment, tech refresh for Airport Surveillance Radar-9 (Weather Systems Processor) and Terminal Doppler Weather Radar, and improved prediction of fog/low ceilings (safety and capacity).
01-Jan-2012 to 10-Jul-2013

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Several systems and initiatives emerge resulting in enhanced weather products that lead to increased capacity, especially at NAS pacing airports during impacting weather. They include new ASOS sensors such as the Ice-free Wind sensor, the Enhanced Precipitation ID sensor, Snow Depth sensor, and Ceilometer that measures clouds to 25kft. In addition, ITWS completes its Final Operational Capability at all 34 sites supporting 47 airports, and interfaces to terminal automation systems providing high-resolution wind data to enhance terminal controller support. Other Terminal area improvements include Wake Vortex (WV) mitigation and the Airport Surveillance Radar-9 Service Life Extension Program that will incorporate Weather System Processor capability.

Having no moving parts, the ASOS Ice-free Wind sensor is unaffected by freezing rain and provides more accurate observations of wind speed/direction during winter storms. The ASOS Enhanced Precipitation ID sensor will more accurately discern the different types of precipitation (i.e., liquid, freezing, frozen), resulting in decreased operational delays since the airport/Hub manager/Airline Operations Center will be aided in planning for aircraft deicing and/or runway snow-removal and icing treatment operations, thereby enhancing surface movement during the winter season. The ASOS Snow Depth sensor will increase knowledge of snow depth and enhances the snowfall prediction rate, resulting in enhancements to both aircraft deicing and runway snow-removal operations.

Terminal Doppler Weather Radar (TDWR) upgrades are implemented and short-term ceiling & visibility predictions are developed [for ITWS] supplementing new separation assurance procedures. By providing improved terminal wind-field information to both automation sytems and personnel, ITWS facilitates increased airport acceptance rates (AAR) by helping reduce WV-imposed separation minima as vortex behavior (drift/dissipation) is better understood. Also, wind information optimizes automation system performance (e.g., active Final Approach Spacing Tool).

Under current procedures, air traffic is sequenced using speed control and vectoring procedures until an aircraft is cleared for the approach. Separation minima are imposed by Air Traffic procedures to account for the WV hazard to an aircraft in trail of a large aircraft during landing or takeoff. As a result, trailing aircraft are spaced farther behind large aircraft in the terminal area, lowering the AAR, depending on the mix of larger/smaller aircraft. Departures are handled in a similar manner until the aircraft is transitioned to the en route environment.

Using weather input from ASOS-enhanced sensors and NEXRAD radar, the WSDDM aids the airport/hub manager [responsible for aircraft deicing/runway snow removal] in planning for aircraft deicing, plowing snow or treating runways for icing, which further enhances terminal surface operations. WSDDM enables the airport/Hub manager to know in advance snowfall intensity as well as snow arrival/cessation times. Oftentimes, the pilot/dispatcher aids in the decision as to when the aircraft needs deicing/snow removal. However, any resulting delays at pacing airports can "ripple" throughout the NAS and degrade operational efficiency. The ASOS 25-Kft ceilometer will increase operational efficiency since ATC specialists will know the altitude extent of Visual Meteorological Conditions/Instrument Meteorological Conditions for Control and Advisory status of vectoring of aircraft. It will also improve weather forecast model performance as a result of enhanced knowledge of the initial state of atmospheric variables.

Actual detection of WV for determining drift and dissipation likely requires that a new sensor be developed and integrated into terminal information/automation systems at pacing airports. This would allow rapid update of atmospheric conditions favorable for WV dissipation, which would enable controllers to reduce separation minima as warranted. A successful nowcast/forecast of airport winds and atmospheric conditions affecting WV drift/duration would increase airport capacity by enabling TRACON controllers to develop aircraft sequencing/merging schemes in advance, thereby mitigating reduced airport acceptance rates [as a result of current procedures], enabling increased airport acceptance rates. Accurate, high-resolution airport wind information from ITWS can be integrated into automation systems to optimize parallel/intersecting runway operations by implementing a technical capability that detects the path of a vortex as it drifts off of a runway or onto a parallel/intersecting runway.

Furthermore, an improved knowledge of terminal atmospheric conditions (climatology/seasonal) is needed to model the character, intensity, and drift of wake vortices. Ultimately, WV forecasts will be achievable (probably after 2015) and will increase airport capacity by allowing advance planning to further reduce WV-imposed separation minima on in-trail aircraft.

Increasing airport capacity by reducing wake vortex-induced delays supports the FAA goal of increasing NAS efficiency (reducing delays) overall. The Wake Vortex program is based on an evolutionary development cycle. The short-term portion of the program involves procedure changes. The mid-term is aimed at integrating procedures and a wind-dependent solution to advance a WV prediction capability based on nearterm forecasted conditions. The long-term effort seeks to develop a WV detection sensor and monitoring capability to aid in reducing separation minima. More importantly, any solution will require the ability to monitor wind, temperature, and pressure along multiple approach/departure corridors. Lastly, this would require an information-sharing architecture for weather data that could be used by a WV decision support tool.

ITWS Wind shear/Microburst prediction capability enhances safety, while a storm growth/decay algorithm for a Terminal Convective Weather Forecast will provide a 1- to 2-hour forecast of thunderstorm location/movement will enable terminal controllers to know when to curtail/begin operations with storm passage. Airport efficiency is enhanced as the Machine Intelligent Gust Front Algorithm predictions extend out to 30-minutes, further optimizing runway usage. ITWS terminal winds products also source terminal automation subsystems of Center TRACON Automation System to optimize their performance. The bottom line is that the requirement for longer weather forecasts (ultimately out to 8 hours for thunderstorms) is paramount since ITWS-airports drive NAS operations.

Expansion of weather to the cockpit capabilities such as Terminal Weather Information to Pilots and Flight Information Services Data Link will provide needed weather information to general aviation and commuter/taxi aircraft pilots once aircraft equipage occurs. This greatly improves common situational awareness between the pilot and controller, facilitating rapid decisionmaking to avoid aviation-impacting weather in the terminal air space. The Aviation Weather Research Program continues to fund applied research in the area of low visibility and ceilings. Also, with the recent implementation of the use of wind-stratified conditional climatology for developing Terminal Area Forecasts (TAF) by the NWS, terminal ceiling and visibility forecast accuracy should increase significantly.

Benefits

Improved weather products increase the predictability of weather, which aids both safety and efficiency-related decisions. More accurate weather predictions not only help avoid weather-constrained approach/departure corridors, but also increase access to non-impacted runways as well.

Systems

Aeronautical Information Management (key system)

The AIM system represents the evolution of the acquisition, storage, processing and dissemination of aeronautical information in the NAS. Aeronautical information is defined as any information concerning the establishment, condition, or change in any component (facility, service, or procedure of, of hazard) of the National Airspace System. Aeronautical information comes in two types a somewhat static type, and a more dynamic type. The static portion represents the aeronautical information baseline as a particular date, while the dynamic portion updates particular aspects of the static portion due to system impacts or events. The Static portion represents data that NAS automation systems and other users use to adapt their software to properly operate. The dynamic portion represents information typically contained in NOTAMs that indicate short-term changes to the static data.

Many NAS systems support the acquisition, generation, and dissemination of the static aeronautical information. Information of this type includes airspace structures, airways, locations of NAS facilities, inter-facility letters of agreement and memorandums of understanding, obstructions, standard procedures, airspace charts, etc.

Several NAS systems also support the acquisition, generation, processing, and dissemination of the dynamic aeronautical information. Information of this type includes, facility outages, runway closures, temporary flight restrictions, airspace constraints, SIGMETs, etc. This information must be disseminated to users and providers of air traffic services in a timely and efficient manner.

AIM will provide the central point for the dissemination of high quality, configuration controlled information to NAS systems, service providers and users of the NAS. AIM will disseminate data based on the Aeronautical Information Exchange Model (AIXM) protocols.

Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) (key system)

The Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) (ASR-9/Mode S (SLEP)) mechanism provide the necessary technical refresh to extend the service life of the ASR-9 and Mode S through 2030. The ASTERIX upgrade has not been implemented, but will be implemented at a later date.
This modification incorporates WSP functionality.

Automated Surface Observing System Pre-Planned Product Improvement (key system)

The Automated Surface Observing System P3I will improve the automated sensors performance. These include an ASOS processor upgrade, improved dew point sensor, ice-free wind sensor, enhanced precipitation identifier, and a 25,000-foot ceilometer.

Automatic Dependent Surveillance - Broadcast Avionics (key system)

Automatic Dependent Surveillance-Broadcast Avionics (ADS-B Avionics) transmits and receives Global Positioning System (GPS)-derived aircraft 4-dimensional position data, aircraft identification, aircraft velocity, and other selected aircraft data. Augmented GPS data may be required for certain applications. This is intended to be a surveillance system and not an avoidance system. The broadcast of own position is automatic and is intended to provide surveillance information to other users. The aircraft or vehicle originating the broadcast may not have knowledge of which users are receiving its broadcast. The ADS-B avionics are designed to transmit this 4-dimensional position data of own aircraft or vehicle and to also receive same type of information from others that are similarly equipped to receive and process ADS-B surveillance information.

BSGS Broadcast Services Ground Station (key system)

The BSGS (Broadcast Services Ground Station) supports Air-Ground broadcast services. This includes the reception of ADS-B from equipped aircraft/vehicles and the transmission of Traffic Information Service-Broadcast (TIS-B) and Flight Information Service-Broadcast (FIS-B) for use by equipped aircraft. Generally, the BSGS will interface via the SDN to provide ADS-B information to ATC automation and receive TIS-B and FIS-B information from TIS-B and FIS-B servers. The BSGS includes antenna(s), one or more dual link (i.e., 1090 MHz Extended Squitter-1090ES and Universal Access Transceiver-UAT) Ground Based Transceiver(s)(GBT), processing functions and communications functions. Several configurations of the BSGS are required to support variations in the geographic service volume and functions to be supported at specific categories of operational sites. BSGSs will be installed at 448 airports and 100 en route locations. Included are those airports equipped with Secondary Surveillance Radar (SSR) and about 140 additional towered airports (currently without SSR). The BSGS will support ADS-B and TIS-B services via both the 1090ES link and by the UAT link. The BSGS will also support FIS-B via the UAT link. BSGSs incorporate a multilink gateway function that provides ADS-B rebroadcasts via the ADS-B alternate link. A BSGS incorporating 2 GBTs are required for airport surface and terminal surveillance coverage at each of 268 smaller airports, a BSGS incorporating 3 GBTs (on average) are required at 120 of the mid-sized airports, and a BSGS incorporating 6 GBTs (on average) are required at the 60 largest airport (those equipped with ASDE-X or ASDE-3 surface surveillance systems).

The following BSGS functions are required to support the various categories of NAS BSGS sites, except as noted below: (1) 1090ES and UAT receive/transmit (i.e., the GBT funnction); (2) multi-link gateway function; (3) process received ADS-B messages and output (via the SDN) ADS-B reports for use by ATC automation; (4) accept TIS-B and FIS-B information from ground TIS-B/FIS-B servers and manage the generation and broadcast of link specific TIS-B messages via the 1090ES and UAT links and FIS-B messages via the UAT link.

The following BSGS configurations are assumed based on the category of the operational site. Except as noted below all BSGS configuration support the above described functions.

En route (100 sites): (1) One multi-sector antenna with each sector connected to the individual 1090ES and UAT receivers. Supports up to 250 nmi. ADS-B reception. En route locations that are intended to provide only low-altitude gap filler coverage do not require the long-range capability. (2) One omni-directional transmit antenna. Transmitter power sized to support the required TIS-B and FIS-B coverage for that specific site.

Terminal/Airport without ASDE-X (415 airports incl. 27 ASDE-3 equipped airports) with each site having: (1) BSGS with at least 2 GBTs with omni-directional antennas sited for both airport surface and terminal airspace coverage; (2) additional GBTs as needed to provide coverage of the primary airport surface movement area.

Terminal/Airport with ASDE-X (26 ASDE-X plus 7 upgraded ASDE-3 airports with an average of 6 GBTs per BSGS): (1) ASDE-X ground stations upgraded to support GBT functionality; (2) At least two of the GBTs provide ADS-B coverage to the edge of the terminal airspace and the TIS-B coverage; (3) ASDE provides the surveillance data source to support TIS-B for surface traffic.

Cockpit Display of Traffic Information Avionics (key system)

The Cockpit Display of Traffic Information Avionics (CDTI Avionics) is a generic name for a display that provides the flight crew with surveillance information about other proximate aircraft, including their position. It enables pilots to electronically "see and avoid" other aircraft.

Commercial Communications Service Provider (key system)

Commercial Communications Service Provider (CCSP) is a commercial entity who provides communications services for a fee.

Communications Management System (key system)

The CMS Management and Control function performs tasks for overall management and control of all air/ground and ground/ground voice and data communications to support System Wide Information Management (SWIM). CMS will also incorporate a reconfiguration control function to support reconfigurable airspace assignments, data routing, and a digital recording for both voice and data.

The En Route Automation Modernization program has assumed the data recording function via the Standard Automation Platform, and the Digital Voice Recorder System performs the voice recording function. The CMS routing function is a data router that ensures transport of data communications among Air Traffic Control facilities and users of SWIM. Additionally, CMS integrates functionalities inherently provided by the voice switches, the voice recorders, and the ATN Router.

Corridor Integrated Weather System (key system)

The CIWS collects various data, then processes, generates, displays, and distributes convective (thunderstorm) weather products to traffic managers at ATCSCC, certain ARTCCs and large TRACONs, and some large airports. The CIWS receives weather data from multiple sensors (primarily radars) and distributes processed thunderstorm information to NAS traffic managers via the System Wide Information Management (SWIM). This system will consist of a hardware processor and associated displays to be used in the TRACON, ARTCC, and ATCSCC.

Digital Voice Recorder System

Provides modern digital voice recording devices used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

In Feburary 2004, the DVRS was upgraded with a 24-channel card, which replaced the 16-channel card. This minor upgrade, called DVR II, was not extended to the systems installed prior to February 2004.

Digital Voice Recorder System Replacement

The Digital Voice Recorder System Replacement (DVRS Replacement) is a modern digital system used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

Digital- Automated Terminal Information Service SLEP

This extends the life of the D-ATIS.

Flight Information System - Data Link (key system)

The Flight Information System - Data Link (FISDL) provides Pilots weather, NOTAM, airfield information and other selected data through a service vendor operating on FAA provided VHF channels. The FISDL service is being facilitated through a FAA/Industry agreement allowing a commercial service provider to offer graphical and textual FIS/weather products to the cockpit of equipped aircraft. This vendor operated service is being provided as a near-term capability consistent with the

FAA FIS Policy Statement of 1998. This vendor operated service will be phased out when the FAA is able to offer simliar FISDL services through FAA operated data link resources (e.g., via the UAT link using the BSGS and TIS-FIS Broadcast Server mechanism).

Integrated Terminal Weather System (key system)

The Integrated Terminal Weather System (ITWS) functions as a weather server in the terminal domain. It acquires data from FAA and National Weather Service (NWS) sensors as well as from aircraft in flight in the terminal area. The ITWS will provide aviation-oriented weather products to Air Traffic Control (ATC) personnel that are immediately usable without further meteorological interpretation.

Integrated Terminal Weather System P3I/Tech Refresh (key system)

The Integrated Terminal Weather System (Pre-Planned Product Improvement) (ITWS (P3I) will implement new and enhanced algorithms as well as interfaces to automation system to support Air Traffic Control (ATC) operations. Possible algorithm enhancements include thunderstorm growth and decay, dry microburst detection, snowfall rate predictions, and data quality. Other potential enhancements include improved external user access and terminal winds products. Additionally, the ITWS (P3I) provides the interface between ITWS and the Standard Terminal Automation Replacement System (STARS).

Low-Level Windshear Alert System - Relocation/Sustain (key system)

The Low-Level Windshear Alert System - Relocation/Sustain (LLWAS-RS) is a system of wind sensors and processor that detects and identifies hazardous low-level wind shear and provides this information in real-time to terminal air traffic controllers. Terminal controllers then provide an air traffic advisory (weather) of the windshear hazard to pilots of aircraft on approach to or departure from the airport. The LLWAS-RS will replace the LLWAS-2 systems and provide the same performance capabilities as the Low-Level Windshear Alert System - Network Expansion (LLWAS-NE) with a remote monitoring capability.

National Weather Service Workstation (key system)

The National Weather Service Workstation (NWS Workstation) enables the Meteorologist to create and disseminate aviation-related weather products (e.g., SIGnificant METeorological Information (SIGMETS), Terminal Aerodrome Forecasts (TAF), etc.) to the FAA and nearby NWS Weather Forecast Offices. The NWS uses various methods to disseminate these products (e.g., Commercial Communications Service Provider (CCSP), internet, NWS-to-FAA telecommunications gateways, etc) to the FAA.

Next Generation Weather Radar Open System (key system)

The Next Generation Weather Radar Open System (NEXRAD Open System) mechanism will upgrade the NEXRAD to an open systems architecture with new hardware, software, and modular configuration. The upgrade will initially increase the radar""s processing capabilities. Subsequent upgrades to the actual radar will reflect radar control via software that enables quicker, tailored scans resulting in more accurate products and improvement to overall system reliability and maintainability.

Antenna upgrades include dual polarization leading to enhanced icing detection.

Operational and Supportability Implementation System (key system)

Operational and Supportability Implementation System (OASIS): The capabilities provided by the OASIS include alphanumeric and graphic weather product acquisition and display, flight plan processing, search and rescue services, and law enforcement support. The OASIS provides a real-time, multi-user, computer-based system that provides current weather information, forecast weather information, Notice to Airmen (NOTAM) information, and flight planning.

OASIS also supports flight service specialists at International Automated Flight Service Stations (IAFSS) that provide services associated with aircraft transiting the oceans.

Power Systems

The Power Systems (Pwr Sys) mechanism provides for the conditioning of commercial power, including uninterruptible power systems (UPS), to eliminate voltage dropouts, surges, and voltage sags caused by sources outside the facility. Power distribution, grounding, bonding and shielding of electrical system within the facility is also part of the Pwr Sys.

The Power Systems (Pwr Sys) mechanism provides the following: 1.) ACEPS Busway Replacements, 2.) ACEPS EG Maintenance, 3.) ACEPS Monitoring & Diagnostics, 4.) ACEPS Fuel System Upgrade, 5.) ACEPS Training, 6.) Battery Monitoring, 7.) Training Facility, 8.) CPDS, 9.) Battery Replacements, 10.) DC Systems, 11.) EG, 12.) LPGBS, 13.) Power Cable, 14.) UPS, 15.) Contract Support.

Standalone Weather Sensors (key system)

The Standalone Weather Sensors (SAWS) is a standalone general support system that provides a backup to ASOS for certain weather parameters at low-level activity (Level C) Air Traffic Control Towers that do not have weather observers. The SAWS system collects, processes, and displays weather data automatically, including wind speed, direction and gust; temperature: relative humidity; and barometric pressure.

Standard Terminal Automation Replacement System (key system)

The Standard Terminal Automation Replacement System (STARS) processes primary and secondary radar information to acquire and track data points to display aircraft position for controllers. STARS provides safety tools such as, conflict alert (CA), Mode C intruder (MCI), final monitoring aid (FMA), Minimum Safe Altitude Warning (MSAW), Converging Runway Display Aid (CARDA), and Controller Automated Spacing Aid (CASA). Also, STARS provides the capability to implement the following enhancements: improved radar processing, Global Positioning System (GPS) compatibility, adaptive routing, Center Terminal Radar Approach Control (TRACON) Automation System (CTAS), data link implementation, improved weather display, and better utilization of traffic management information.

Standard Terminal Automation Replacement System Terminal Controller Workstation (key system)

The Standard Terminal Automation Replacement System Terminal Controller Workstation (STARS TCW) provides the interface between the Terminal Radar Approach Control (TRACON) controller and the STARS processing unit.

Surface Traffic Management System (key system)

The Surface Traffic Management System (STMS) provides flight and track data for surface management, combining the functions of SMA (FFP1) and SMS Prototype systems. Similar to SMS, the STMS servers and display processors will be located at the same facilities and, in addition, display processors will be located at the ATCSCC and Hub site. STMS data will include gate assignment information, downstream restrictions and air carrier predictions of flight push-back times. STMS may be enhanced to add communications via data link to the cockpit.

System Wide Information Management Build 1A (key system)

SWIM provides for National Airspace System (NAS)-wide transport and sharing of information between the Federal Aviation Administration and users. SWIM is a consistent and single point of entry for users to publish and subscribe to NAS data. SWIM provides context-sensitive information to NAS elements that require the information. SWIM replaces many single-focus networks, such as FIRMNet and CDMnet. This build will integrate Aeronautical, Weather, and NAS Resource Status information systems into the SWIM architecture. A SWIM Management Unit, at each facility, will support the sending (publishing) and receiving (subscribing) of data on SWIM and the SDN. A central SWIM Directory Management Unit will maintain a directory of data available for subscription and publication.

System Wide Information Management Build 1B (key system)

Build 1B provides all items in 1A, including more NAS information. This build integrates Flight and Surveillance Information systems into the SWIM architecture.

Terminal Doppler Weather Radar - Technical Refresh (key system)

The Terminal Doppler Weather Radar technical refresh mechanism funds needed upgrades to the TDWR system. Improvements included replacing the system processor, upgrades to scan tracking (to 360 degree vice sector scan) and Radar Product Generator, Backup Communications, Uninterruptible Power Supply (UPS), modifications to battery, and safety modifications for the antenna.

Terminal Doppler Weather Radar Service Life Extension Program (key system)

The Terminal Doppler Weather Radar Service Life Extension Program (TDWR SLEP) mechanism funds the service live extension efforts to continue operation of the TDWR system. Upgrades include new hardware and re-hosting software for the Digital Signal Processor (DSP), RDA (receiver replacement), replacing antenna motors and hardened elevation drive bullgear/bearings.

Wake Vortex System (key system)

The Wake Vortex System consists of a sensor suite that contains several sub-systems. It will constantly monitor wind, temperature, and turbulence along multiple approach/departure corridors as well as make short term (1 hour) predictions of changes for these parameters. Those expected changes in wind, temperature, and turbulence will be used to predict the time required for wake vortices (WV) to either move out of an approach corridor, onto a crossing or parallel runway, or to dissipate. These predictions will be fed into terminal automation systems (e.g., aFAST) to assist controllers in adjusting approach/departure spacing minima to mitigate the impact of WV on airport acceptance rates.

Weather Message Switching Center Replacement (WMSCR) Sustain (key system)

The Weather Message Switching Center Replacement (WMSCR) sustainment activity will sustain the existing WMSCR functionality of distributing alphanumeric weather text and NOTAM products through a hardware and software upgrade program. This upgrade program will consist of Commercial-off-the-Shelf processors, physical disk drives, workstations, network routers, printer, operating system, High Order Language programming software, and other commercially available software packages.

Weather System Processor (key system)

The Weather System Processor (WSP) provides precipitation, windshear, microburst, and precipitation data at 39 terminal areas that require wind shear coverage but do not warrant a Terminal Doppler Weather Radar. WSP generates weather products (microburst detection, gust front detection, wind shift prediction, and precipitation detection and tracking) derived from additional processing of Airport Surveillance Radar-9 (ASR-9) weather data.

Weather Systems Processor (Technological Refresh) (key system)

The Weather Systems Processor (Technological Refresh) (WSP (Tech Refresh)) is a technological refresh of Commercial off-the-Shelf (COTS) equipment procured under the original Airport Surveillance Radar-Weather Systems Processor (ASR-WSP) program. WSP COTS equipment refresh cycle is expected every six (6) to seven (7) years to maintain operational condition of equipment.

Weather and Radar Processor (WARP) Replacement (key system)

The Weather and Radar Processor (WARP) will undergo a hardware and software upgrade to receive, process, display, and disseminate enhanced weather products (i.e., forecasts of thunderstorms)from a variety of sensors to provide tailored weather information to Traffic Managers on briefing terminals and ETMS (TFM-M), En route controllers (DSR), as well as gridded weather data to automation systems (e.g., URET, DOTS+, ATOP, CTAS/TMA/DA, etc). It will provide enhanced forecasting tools to CWSU meteorologists, and enhances weather support to oceanic operations with various forecasts of turbulence, volcanic ash plumes, and thunderstorms in gridded format. It also provides a telecommunications upgrade to support emerging FAA Telecommunications Infrastructure (FTI) services; incorporate enhanced computer security features and provide an organic maintenance capability.

Support Activities

AF Procedure Development for Improved Terminal Weather Products

Airway Facilities procedures document the way airway facility operations are to be executed. The introduction of new systems, or changes to existing systems results in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

AF Training for Improved Terminal Weather Products

Airway Facilities (AF) training is provided to AF workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AF Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

AT Procedure Development for Improved Terminal Weather Products

Air Traffic Procedures document air traffic services and how they are implemented. The introduction of new systems, or changes to existing systems, may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

FAA Adaptation for Improved Terminal Weather Products

Many NAS systems incorporate parameters that are adjustable. This allows for the setting of system parameters to optimize performance at each particular site. When new systems that have adjustable parameters are introduced into the NAS, adaptation data must be developed for the system. Environmental and procedural changes may also result in the need to modify FAA Adaptation Data. Generally, adaptation will begin 12 months before IOC and continue until 12 months after IOC.

Non-FAA Pilot Training for Improved Terminal Weather Products

Non-FAA Pilot Training is provided to educate pilots as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional pilot training. Training will generally begin 60 days prior to IOC and be complete within one year following Full Operating Capability.

Non-FAA Training for Improved Terminal Weather Products

Non-FAA Training is provided to educate users and their workforces as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional pilot training. Training will generally begin 60 days prior to IOC and be complete within one year following Full Operating Capability.

People

Airline Operations Center Dispatcher

The Airline Operations Center Dispatcher (AOC Dispatcher) is a major airline employee that enters bulk flight plan requests and works with FAA by revising schedules and providing flight cancellations based on FAA provided data (aggregate demand lists, arrival rates, and parameters for anticipated ground delays.)

Clearance Delivery

A Clearance Delivery Controller performs the following activities: Operate communications equipment; process and forward flight plan information; issue clearances and ensure accuracy of pilot read back; assist tower cab in meeting situation objectives; operate tower equipment; utilize alphanumerics.

Ground Controller

A Ground Controller performs the following activities: Ensure separation; Control vehicles as well as aircraft on movement areas other than active runways Initiate control instructions; Monitor and operate communications equipment; Utilize tower radar display(s); Utilize alphanumerics; Assist the tower associate controller with coordination; Scan tower cab environment; Ensure computer entries and strip marking are completed for instructions or clearances issued or received; Process and forward flight plan information; Perform any functions of the tower team which will assist in meeting situation objectives; Coordinate with local control for safe and efficient use of runways and movement areas.

Local Controller

A Local Controller performs the following activities: Ensure separation; Control active runways; Initiate control instructions; Monitor and operate communications equipment; Utilize tower radar display(s); Utilize alphanumerics; Assist the tower associate controller with coordination; Scan tower cab environment; Ensure computer entries and strip marking are completed for instructions or clearances issued or received; Process and forward flight plan information; Perform any functions of the tower team which will assist in meeting situation objectives; Coordinate with ground control for safe and efficient use of runways and movement areas.

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Radar Controller

A Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate automated handoffs; Assist the radar associate controller with non-automated handoff actions when needed; Assist the radar associate controller in coordination when needed; Scan radar display; Correlate with flight progress strip information; Ensure computer entries are completed on instructions or clearances you issue or receive; Ensure strip marking is completed on instructions or clearances you issue or receive.

Ramp Controller

The Ramp Controller designated by the airline directs the movement of aircraft from the gates and on the ramp to a specific point that is defined by the agreement between the carrier and FAA.

Traffic Management Coordinators

Traffic Management Coordinators track and predict traffic flows, analyze ground delays, evaluate alternative routing strategies, and plan local traffic patterns at the local facility (ARTCC, TRACON, or Towers)

Interfaces

Aeronautical Information Management ← (NAS Status Data) → System Wide Information Management Build 1A

AIM exchanges NAS Status data, including equipment status, airspace schedules and status, contingency routings, and RNP-RNAV routings, with other systems via SWIM.

Aeronautical Information Management — (Weather Data) → System Wide Information Management Build 1A

AIM provides PIREPS for distribution to NAS users via SWIM.

Aeronautical Information Management ← (NAS Status Data) → System Wide Information Management Build 1B

"AIM exchanges NAS Status data, including equipment status, airspace schedules and status, contingency routings, and RNP-RNAV routings, with other systems via SWIM.

Aeronautical Information Management — (Weather Data) → System Wide Information Management Build 1B

AIM provides PIREPS for distribution to NAS users via SWIM.

Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) — (Surveillance Data) → Standard Terminal Automation Replacement System

The ASR-9 ground radar provides aircraft positional (azimuth and slant range) as well as time tag, identification, and intent data in ASTERIX format to STARS for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) — (Surveillance Data) → System Wide Information Management Build 1A

The ASR-9 provides surveillance data to SWIM for distribution to automation systems and other authorized systems and users.

Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) — (Weather Data) → System Wide Information Management Build 1A

The ASR-9 provides surveillance data to SWIM for distribution to automation systems and other authorized systems and users.

Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) — (Surveillance Data) → System Wide Information Management Build 1B

The ASR-9 provides surveillance data to SWIM for distribution to automation systems and other authorized systems and users.

Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) — (Weather Data) → System Wide Information Management Build 1B

The ASR-9 provides surveillance data to SWIM for distribution to automation systems and other authorized systems and users.

Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) — (Weather Data) → Weather Systems Processor (Technological Refresh)

The ASR-9 weather channel provides 6-level precipitation data to the WSP to support product generation. ASR-WSP products include reflectivity and storm motion, wind shear/microburst alerts, and gust front products. In addition, the WSP will display ASR-9 reflectivity data (similar to ITWS) in standard NWS six-level color presentation after removing any anomalous propagation (false weather radar returns) that may be present.

Automated Surface Observing System Pre-Planned Product Improvement — (Weather Data) → Terminal Doppler Weather Radar - Technical Refresh

The ASOS sends wind speed/direction and wind gust data to the TDWR.

Automated Surface Observing System Pre-Planned Product Improvement — (Weather Data) → Terminal Doppler Weather Radar Service Life Extension Program

The ASOS sends wind speed/direction and wind gust data to the TDWR.

Automated Surface Observing System Pre-Planned Product Improvement — (Weather Data) → Weather Message Switching Center Replacement (WMSCR) Sustain

This interface supplies surface observation data (e.g., wind, temperature, visibility, and precipitation) to Weather Message Switching Center Replacement (WMSCR).

Automated Surface Observing System Pre-Planned Product Improvement — (Weather Data) → Weather Systems Processor (Technological Refresh)

The ASOS sends wind speed/direction and wind gust data to the WSP.

Automatic Dependent Surveillance - Broadcast Avionics ← (Target Data) → Automatic Dependent Surveillance - Broadcast Avionics

Air-to-air ADS-B target data is exchanged between aircraft for use initially as a situation awareness enhancement. This capability will be expanded to other future applications, such as precision approach and landing and self separation.

Automatic Dependent Surveillance - Broadcast Avionics ← (Target Data) → BSGS Broadcast Services Ground Station

The GBT intercepts ADS-B transmissions from aircraft in the coverage area of the GBT. The GBT transmits ADS-B reports it receives down the UAT link back up the 1090 link and vice versa.

Automatic Dependent Surveillance - Broadcast Avionics — (Target Data) → Cockpit Display of Traffic Information Avionics

The ADS-B avionics provides the flight crew surveillance information about other aircraft in the area and is displayed on the CDTI. This information is initially used for enhanced situation awareness and will be expanded to other future applications such as precision approach and landing and self separation.

BSGS Broadcast Services Ground Station — (Weather Data) → Automatic Dependent Surveillance - Broadcast Avionics

ADS-B Avionics (with weather application) can receive FIS weather products broadcasted by the BSGS via an ADS-B data link.

BSGS Broadcast Services Ground Station — (Surveillance Data) → System Wide Information Management Build 1A

The GBT provides ADS-B reports to the SDN for distribution to automation systems and other authorized systems and user

BSGS Broadcast Services Ground Station — (Surveillance Data) → System Wide Information Management Build 1B

The GBT provides ADS-B reports to the SDN for distribution to automation systems and other authorized systems and user.

Communications Management System ← (Data Communication) → Communications Management System

Controllers in the same or different facilities communicate via CMS.

Communications Management System ← (Voice Communication) → Communications Management System

Controllers in the same or different facilities communicate via CMS.

Corridor Integrated Weather System — (Weather Data) → Weather and Radar Processor (WARP) Replacement

CIWS passes convective forecast products to WARP for CWSU display and forwarding (to various users) via WARP WINS.

Integrated Terminal Weather System — (Weather Data) → Integrated Terminal Weather System

The Integrated Terminal Weather System NFU located in the ATCSCC provides site-specific MDCRS and Rapid Update Cycle (RUC) forecast data to the other ITWS Product Generators which provide tailored products to Towers and TRACONs in CONUS and Puerto Rico.

Integrated Terminal Weather System — (Weather Data) → Standard Terminal Automation Replacement System

The ITWS will provide integrated terminal weather products to the STARS Application Interface Gateway for subsequent display on the STARS TCW and TDW display via the TCP/IP protocol. This is the manner by which the radar and local controller will have access to integrated weather products.

Integrated Terminal Weather System ← (Weather Data) → System Wide Information Management Build 1A

ITWS publishes and subscribes to weather data on SWIM.

Integrated Terminal Weather System ← (Weather Data) → System Wide Information Management Build 1B

ITWS publishes and subscribes to weather data on SWIM.

National Weather Service Workstation ← (Weather Data) → System Wide Information Management Build 1A

The NWS workstation publishes and subscribes to weather data on SWIM.

Next Generation Weather Radar Open System — (Weather Data) → Corridor Integrated Weather System

NEXRAD provides radar base data (not products) to CIWS.

Next Generation Weather Radar Open System ← (Weather Data) → Integrated Terminal Weather System P3I/Tech Refresh

The NEXRAD will provide precipitation, hail, and tornado products to the ITWS

Next Generation Weather Radar Open System — (Weather Data) → System Wide Information Management Build 1A

NEXRAD publishes weather data on SWIM.

Next Generation Weather Radar Open System — (Weather Data) → System Wide Information Management Build 1B

NEXRAD publishes weather data on SWIM.

Next Generation Weather Radar Open System — (Weather Data) → Weather and Radar Processor (WARP) Replacement

The NEXRAD transmits precipitation, hail, and tornado products to the WARP

Standard Terminal Automation Replacement System — (Track Data) → Standard Terminal Automation Replacement System Terminal Controller Workstation

The STARS provides aircraft positions and flight information to the STARS TCW for controller use.

Standard Terminal Automation Replacement System — (Weather Data) → Standard Terminal Automation Replacement System Terminal Controller Workstation

The STARS provides weather data information to the STARS TCW for controller use.

System Wide Information Management Build 1A — (Flight Data) → BSGS Broadcast Services Ground Station

FOMS provides the flight object to the GBT for transmission to aircraft via SWIM.

System Wide Information Management Build 1A — (NAS Status Data) → BSGS Broadcast Services Ground Station

The GBT receives NAS Status Data, including NOTAMS, via SWIM for broadcast to aircraft equipped with UAT communication equipment.

System Wide Information Management Build 1A — (Data Communication) → Communications Management System

Pilots can access data available on SWIM via radios and CMS.

System Wide Information Management Build 1A — (Weather Data) → Operational and Supportability Implementation System

OASIS subscribes to weather data on SWIM.

System Wide Information Management Build 1A — (Surveillance Data) → Standard Terminal Automation Replacement System

The SDN distributes surveillance data received from various sensors to NAS automation systems.

System Wide Information Management Build 1B — (Flight Data) → BSGS Broadcast Services Ground Station

FOMS provides the flight object to the GBT for transmission to aircraft via SWIM.

System Wide Information Management Build 1B — (NAS Status Data) → BSGS Broadcast Services Ground Station

"The GBT receives NAS Status Data, including NOTAMS, via SWIM for broadcast to aircraft equipped with UAT communication equipment.

System Wide Information Management Build 1B — (Data Communication) → Communications Management System

Pilots can access data available on SWIM via radios and CMS.

System Wide Information Management Build 1B — (Weather Data) → Operational and Supportability Implementation System

OASIS subscribes to weather data on SWIM.

System Wide Information Management Build 1B — (Surveillance Data) → Standard Terminal Automation Replacement System

The SDN distributes surveillance data received from various sensors to NAS automation systems.

Terminal Doppler Weather Radar - Technical Refresh — (Weather Data) → Integrated Terminal Weather System

TDWR provides microburst, gust front, runway oriented threshold winds, and center field wind products to the ITWS. Plus, base radar data and LLWAS-NE products will be merged by ITWS with data from other terminal weather sensors to develop ITWS weather products.

Terminal Doppler Weather Radar - Technical Refresh — (Weather Data) → Standard Terminal Automation Replacement System

TDWR provides integrated weather data to STARS.

Terminal Doppler Weather Radar - Technical Refresh — (Weather Data) → System Wide Information Management Build 1A

TDWR publishes weather data on SWIM.

Terminal Doppler Weather Radar - Technical Refresh — (Weather Data) → System Wide Information Management Build 1B

TDWR publishes weather data on SWIM.

Terminal Doppler Weather Radar Service Life Extension Program — (Weather Data) → Standard Terminal Automation Replacement System

TDWR provides integrated weather data to STARS.

Terminal Doppler Weather Radar Service Life Extension Program — (Weather Data) → System Wide Information Management Build 1A

TDWR publishes weather data on SWIM.

Terminal Doppler Weather Radar Service Life Extension Program — (Weather Data) → System Wide Information Management Build 1B

TDWR publishes weather data on SWIM.

Weather Message Switching Center Replacement (WMSCR) Sustain ← (Weather Data) → Operational and Supportability Implementation System

The WMSCR provides NOTAMS and alphanumeric weather products to OASIS.

Weather Message Switching Center Replacement (WMSCR) Sustain — (Weather Data) → System Wide Information Management Build 1A

WMSCR publishes weather data on SWIM.

Weather Message Switching Center Replacement (WMSCR) Sustain — (Weather Data) → System Wide Information Management Build 1B

WMSCR publishes weather data on SWIM.

Weather System Processor — (Weather Data) → Standard Terminal Automation Replacement System

The WSP provides windshear, microburst, and gust front products to the STARS application interface gateway for subsequent display on TCW and TDW displays. The radar and local controller uses this information to advise pilots of hazardous weather conditions within the terminal domain.

Weather System Processor — (Weather Data) → System Wide Information Management Build 1A

WSP publishes weather data on SWIM.

Weather System Processor — (Weather Data) → System Wide Information Management Build 1B

WSP publishes weather data on SWIM.

Weather Systems Processor (Technological Refresh) — (Weather Data) → Standard Terminal Automation Replacement System

The WSP (Tech Refresh) provides windshear, microburst, and gust front products to the STARS application interface gateway for subsequent display on TCW and TDW displays. The radar and local controller uses this information to advise pilots of hazardous weather conditions within the terminal domain.

Weather Systems Processor (Technological Refresh) — (Weather Data) ➔ System Wide Information Management Build 1A
WSP publishes weather data on SWIM.
Weather Systems Processor (Technological Refresh) — (Weather Data) ➔ System Wide Information Management Build 1B
WSP publishes weather data on SWIM.
Weather and Radar Processor (WARP) Replacement — (Weather Data) ➔ Integrated Terminal Weather System
The WARP (Tech Refresh) and ITWS exchanges weather products to help terminal controllers assist aircrews in avoiding hazardous weather and traffic managers for contingency planning.
Weather and Radar Processor (WARP) Replacement — (Weather Data) ➔ Operational and Supportability Implementation System
This upgrade enables WARP to provide the Operational and Supportability Implementation System (OASIS) with weather data (alphanumeric and graphic weather products). This will aid the Flight Service Specialist in flight planning services to the user.
Weather and Radar Processor (WARP) Replacement — (Data Communication) ➔ System Wide Information Management Build 1A
Late in lifecyclc, WARP provides Wx data via early stage of SWIM
Weather and Radar Processor (WARP) Replacement — (Weather Data) ➔ System Wide Information Management Build 1A
WARP publishes weather data on SWIM.
Weather and Radar Processor (WARP) Replacement — (Weather Data) ➔ System Wide Information Management Build 1B
WARP publishes weather data on SWIM.

Issues

1. Expedite fielding of ITWS with CWF (convective weather forecast) capability--it has demonstrated the ability to save airlines big $$ (via delay benefits) during thunderstorm & snow events in NY area. (Note: yet ATB says Medium-Intensity Airport Weather System (MIAWS) is highest ranked system (via Expert Choice) above that of ITWS and STARS!!) 2. FIS success (benefits) dependent on aircraft equipage 3. WSDDM needs FAA implementation at snow-susceptible,ITWS airports 4. WV sensor requires cost-benefit analysis prior to implementation

Service Group Air Traffic Services
Service ATC-Advisory
Capability Weather Advisories Capability
Operational Improvement

Provide Automatic Hazardous Weather Alert Notification (103117)

Common situational awareness between pilots and controllers is enhanced via immediate, simultaneous dissemination of hazardous weather to both NAS service providers and users via voice circuits and datalink.
01-Jun-2015 to 21-Jan-2021

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

This operational improvement involves immediate, simultaneous distribution of hazardous weather alerts, particularly wind shear and microbursts, to NAS service providers and users. All recipients receive a similar depiction of hazardous weather impacting the NAS.

Augmenting voice transmission over radio circuits, Ground Based Transceivers will broadcast hazardous weather alerts immediately to equipped aircraft via data links for display on the Cockpit Display of Traffic Information avionics. These hazardous weather alerts include information on microbursts/wind shear or turbulence encounters received in an urgent Pilot Report that would be sent to aircraft in the vicinity.

Next Generation Air/Ground Communications air and ground radios will provide pilots access to weather data on System Wide Information Management (SWIM) via the Communications Management System and the SWIM Management Unit. Since data-link technology and aircraft equipage will not be routinely available in 2015, this improvement will not be fully implemented by then.

Benefits

Automatic and immediate notification of hazardous weather (e.g., wind shear and microbursts alerts) enhances NAS safety.

Systems

Automatic Dependent Surveillance - Broadcast Avionics (key system)
Automatic Dependent Surveillance-Broadcast Avionics (ADS-B Avionics) transmits and receives Global Positioning System (GPS)-derived aircraft 4-dimensional position data, aircraft identification, aircraft velocity, and other selected aircraft data. Augmented GPS data may be required for certain applications. This is intended to be a surveillance system and not an avoidance system. The broadcast of own position is automatic and is intended to provide surveillance information to other users. The aircraft or vehicle originating the broadcast may not have knowledge of which users are receiving its broadcast. The ADS-B avionics are designed to transmit this 4-dimensional position data of own aircraft or vehicle and to also receive same type of information from others that are similarly equipped to receive and process ADS-B surveillance information.
BSGS Broadcast Services Ground Station (key system)

The BSGS (Broadcast Services Ground Station) supports Air-Ground broadcast services. This includes the reception of ADS-B from equipped aircraft/vehicles and the transmission of Traffic Information Service-Broadcast (TIS-B) and Flight Information Service-Broadcast (FIS-B) for use by equipped aircraft. Generally, the BSGS will interface via the SDN to provide ADS-B information to ATC automation and receive TIS-B and FIS-B information from TIS-B and FIS-B servers. The BSGS includes antenna(s), one or more dual link (i.e., 1090 MHz Extended Squitter-1090ES and Universal Access Transceiver-UAT) Ground Based Transceiver(s)(GBT), processing functions and communications functions. Several configurations of the BSGS are required to support variations in the geographic service volume and functions to be supported at specific categories of operational sites. BSGSs will be installed at 448 airports and 100 en route locations. Included are those airports equipped with Secondary Surveillance Radar (SSR) and about 140 additional towered airports (currently without SSR). The BSGS will support ADS-B and TIS-B services via both the 1090ES link and by the UAT link. The BSGS will also support FIS-B via the UAT link. BSGSs incorporate a multilink gateway function that provides ADS-B rebroadcasts via the ADS-B alternate link. A BSGS incorporating 2 GBTs are required for airport surface and terminal surveillance coverage at each of 268 smaller airports, a BSGS incorporating 3 GBTs (on average) are required at 120 of the mid-sized airports, and a BSGS incorporating 6 GBTs (on average) are required at the 60 largest airport (those equipped with ASDE-X or ASDE-3 surface surveillance systems).

The following BSGS functions are required to support the various categories of NAS BSGS sites, except as noted below: (1) 1090ES and UAT receive/transmit (i.e., the GBT funnction); (2) multi-link gateway function; (3) process received ADS-B messages and output (via the SDN) ADS-B reports for use by ATC automation; (4) accept TIS-B and FIS-B information from ground TIS-B/FIS-B servers and manage the generation and broadcast of link specific TIS-B messages via the 1090ES and UAT links and FIS-B messages via the UAT link.

The following BSGS configurations are assumed based on the category of the operational site. Except as noted below all BSGS configuration support the above described functions.

En route (100 sites): (1) One multi-sector antenna with each sector connected to the individual 1090ES and UAT receivers. Supports up to 250 nmi. ADS-B reception. En route locations that are intended to provide only low-altitude gap filler coverage do not require the long-range capability. (2) One omni-directional transmit antenna. Transmitter power sized to support the required TIS-B and FIS-B coverage for that specific site.

Terminal/Airport without ASDE-X (415 airports incl. 27 ASDE-3 equipped airports) with each site having: (1) BSGS with at least 2 GBTs with omni-directional antennas sited for both airport surface and terminal airspace coverage; (2) additional GBTs as needed to provide coverage of the primary airport surface movement area.

Terminal/Airport with ASDE-X (26 ASDE-X plus 7 upgraded ASDE-3 airports with an average of 6 GBTs per BSGS): (1) ASDE-X ground stations upgraded to support GBT functionality; (2) At least two of the GBTs provide ADS-B coverage to the edge of the terminal airspace and the TIS-B coverage; (3) ASDE provides the surveillance data source to support TIS-B for surface traffic.

Cockpit Display of Traffic Information Avionics (key system)

The Cockpit Display of Traffic Information Avionics (CDTI Avionics) is a generic name for a display that provides the flight crew with surveillance information about other proximate aircraft, including their position. It enables pilots to electronically "see and avoid" other aircraft.

Communications Management System (key system)

The CMS Management and Control function performs tasks for overall management and control of all air/ground and ground/ground voice and data communications to support System Wide Information Management (SWIM). CMS will also incorporate a reconfiguration control function to support reconfigurable airspace assignments, data routing, and a digital recording for both voice and data.

The En Route Automation Modernization program has assumed the data recording function via the Standard Automation Platform, and the Digital Voice Recorder System performs the voice recording function. The CMS routing function is a data router that ensures transport of data communications among Air Traffic Control facilities and users of SWIM. Additionally, CMS integrates functionalities inherently provided by the voice switches, the voice recorders, and the ATN Router.

Digital Voice Recorder System Replacement

The Digital Voice Recorder System Replacement (DVRS Replacement) is a modern digital system used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

Low-Level Windshear Alert System - Relocation/Sustainment Tech Refresh (key system)

The Low-Level Windshear Alert System - Relocation/Sustainment tech refresh program will sustain the system''s existing capabilities by incorporating software algorithm block updates, and processor/sensor improvements.

National Weather Service Workstation (key system)

The National Weather Service Workstation (NWS Workstation) enables the Meteorologist to create and disseminate aviation-related weather products (e.g., SIGnificant METeorological Information (SIGMETS), Terminal Aerodrome Forecasts (TAF), etc.) to the FAA and nearby NWS Weather Forecast Offices. The NWS uses various methods to disseminate these products (e.g., Commercial Communications Service Provider (CCSP), internet, NWS-to-FAA telecommunications gateways, etc) to the FAA.

Power Systems

The Power Systems (Pwr Sys) mechanism provides for the conditioning of commercial power, including uninterruptible power systems (UPS), to eliminate voltage dropouts, surges, and voltage sags caused by sources outside the facility. Power distribution, grounding, bonding and shielding of electrical system within the facility is also part of the Pwr Sys.

The Power Systems (Pwr Sys) mechanism provides the following: 1.) ACEPS Busway Replacements, 2.) ACEPS EG Maintenance, 3.) ACEPS Monitoring & Diagnostics, 4.) ACEPS Fuel System Upgrade, 5.) ACEPS Training, 6.) Battery Monitoring, 7.) Training Facility, 8.) CPDS, 9.) Battery Replacements, 10.) DC Systems, 11.) EG, 12.) LPGBS, 13.) Power Cable, 14.) UPS, 15.) Contract Support.

System Wide Information Management Build 2 (key system)

SWIM Build 2 provides all items in both 1A and 1B, including air-ground network integration. Build 2 includes integration of SWIM with the Aeronautical Telecommunications Network, Next Generation Air/Ground Communications, Satellite Communications, Ground Based Transceivers, Traffic Information Service-Broadcast, and Flight Information Service-Broadcast.

Support Activities

FAA Certification for Automatic Hazardous Weather Alert Notification

FAA certification is an activity necessary to support people and systems in the delivery of NAS services. Avionics and associated systems are deemed to be critical to the safety of flight and must be certificated. In addition certain operators and service providers require to be certified such as pilots, dispatchers and others. Certification will generally begin 24 months prior to Initial Operating Capability, and be complete prior to receiving or giving service.

People

Airline Operations Center Dispatcher

The Airline Operations Center Dispatcher (AOC Dispatcher) is a major airline employee that enters bulk flight plan requests and works with FAA by revising schedules and providing flight cancellations based on FAA provided data (aggregate demand lists, arrival rates, and parameters for anticipated ground delays.)

Ground Controller

A Ground Controller performs the following activities: Ensure separation; Control vehicles as well as aircraft on movement areas other than active runways Initiate control instructions; Monitor and operate communications equipment; Utilize tower radar display(s); Utilize alphanumerics; Assist the tower associate controller with coordination; Scan tower cab environment; Ensure computer entries and strip marking are completed for instructions or clearances issued or received; Process and forward flight plan information; Perform any functions of the tower team which will assist in meeting situation objectives; Coordinate with local control for safe and efficient use of runways and movement areas.

Local Controller

A Local Controller performs the following activities: Ensure separation; Control active runways; Initiate control instructions; Monitor and operate communications equipment; Utilize tower radar display(s); Utilize alphanumerics; Assist the tower associate controller with coordination; Scan tower cab environment; Ensure computer entries and strip marking are completed for instructions or clearances issued or received; Process and forward flight plan information; Perform any functions of the tower team which will assist in meeting situation objectives; Coordinate with ground control for safe and efficient use of runways and movement areas.

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Radar Controller

A Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate automated handoffs; Assist the radar associate controller with non-automated handoff actions when needed; Assist the radar associate controller in coordination when needed; Scan radar display; Correlate with flight progress strip information; Ensure computer entries are completed on instructions or clearances you issue or receive; Ensure strip marking is completed on instructions or clearances you issue or receive.

Ramp Controller

The Ramp Controller designated by the airline directs the movement of aircraft from the gates and on the ramp to a specific point that is defined by the agreement between the carrier and FAA.

Traffic Management Specialist

Traffic Management Specialists perform the following activities: Balance air traffic demand with the airspace's capacity to maintain maximum and efficient utilization of the NAS; Coordinate and implement traffic management directives if needed for area of responsibility; Monitor and balance traffic flows within the area of responsibility in accordance with traffic management directives; Evaluate effectiveness of traffic management directives and make necessary adjustments; Document delay information.

Interfaces

Automatic Dependent Surveillance - Broadcast Avionics ← (Target Data) → Automatic Dependent Surveillance - Broadcast Avionics

Air-to-air ADS-B target data is exchanged between aircraft for use initially as a situation awareness enhancement. This capability will be expanded to other future applications, such as precision approach and landing and self separation.

Automatic Dependent Surveillance - Broadcast Avionics ← (Target Data) → BSGS Broadcast Services Ground Station

The GBT intercepts ADS-B transmissions from aircraft in the coverage area of the GBT. The GBT transmits ADS-B reports it receives down the UAT link back up the 1090 link and vice versa.

Automatic Dependent Surveillance - Broadcast Avionics — (Target Data) → Cockpit Display of Traffic Information Avionics

The ADS-B avionics provides the flight crew surveillance information about other aircraft in the area and is displayed on the CDTI. This information is initially used for enhanced situation awareness and will be expanded to other future applications such as precision approach and landing and self separation.

BSGS Broadcast Services Ground Station — (Weather Data) → Automatic Dependent Surveillance - Broadcast Avionics

ADS-B Avionics (with weather application) can receive FIS weather products broadcasted by the BSGS via an ADS-B data link.

BSGS Broadcast Services Ground Station — (Surveillance Data) → System Wide Information Management Build 2

The GBT provides ADS-B reports to the SDN for distribution to automation systems and other authorized systems and user.

Communications Management System ← (Data Communication) → Communications Management System

Controllers in the same or different facilities communicate via CMS.

Communications Management System ← (Voice Communication) → Communications Management System

Controllers in the same or different facilities communicate via CMS.

System Wide Information Management Build 2 — (Flight Data) → BSGS Broadcast Services Ground Station

FOMS provides the flight object to the GBT for transmission to aircraft via SWIM.

System Wide Information Management Build 2 — (NAS Status Data) → BSGS Broadcast Services Ground Station

"The GBT receives NAS Status Data, including NOTAMS, via SWIM for broadcast to aircraft equipped with UAT communication equipment.

System Wide Information Management Build 2 — (Data Communication) → Communications Management System

Pilots can access data available on SWIM via radios and CMS.

Issues

Data link availability with ADS-B and appropriately equipped aircraft.

Service Group Air Traffic Services

Service ATC-Advisory

Capability Weather Advisories Capability

Support CDM with Simultaneous Hazardous Weather Notification (103112)

Common situational awareness improves through similar depiction of NAS-impacting weather to pilots, controllers, and traffic managers as SWIM facilitates near simultaneous dissemination of aviation-impacting weather to both service providers and users.

01-Sep-2011 to 01-Jan-2010

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

This operational improvement involves processing and near-simultaneous distribution of weather data to National Airspace System (NAS) service providers and users. All receive a similar depiction of the hazardous weather impacting the NAS, which improves coordination and collaboration on hazardous weather avoidance. Domain weather servers, Integrated Terminal Weather Service, and Weather and Radar Processor (and its successor--the Global Weather Information System) evolve from serving only en route or terminal areas to NAS-wide applications. No new sensors are added to the NAS during this improvement, but new products emerge from aviation weather research and development. A single weather processor, called the General Weather Processor (GWP), will generate weather products for all Air Traffic Control (ATC) facilities (domains), and for the most part replace the domain weather servers. A likely exception, however, will be that some local processing will be needed for windshear/microburst and associated alerts, by a successor system to ITWS and MIAWS.

Additionally, weather data will be distributed via the System Wide Information Management (SWIM) system, precluding the need for a direct interface between service providers and user systems to the GWP or weather sensors. Common situational awareness of hazardous weather impacting the NAS will be available and improve the ability of FAA service providers and users to collaborate on weather avoidance programs. The Standard Automation Platform (SAP) Workstation, SAP Remote Workstation, Flight Advisory System Display, and the Integrated Information Workstation will display the common weather picture to personnel in ATC facilities. They will all receive the latest weather information almost simultaneously due to the inherent features of SWIM. Ground Based Transceivers (GBT) will broadcast the common weather picture to equipped aircraft on data links for display on Cockpit Display of Traffic Information avionics. Broadcast weather products will include precipitation, lightning, in-flight icing, low-ceiling/visibility maps, surface hazards, wind shear/turbulence information, and site-specific weather reports and forecasts. Weather alerts will be broadcast immediately via GBTs. Next Generation Air/Ground Communications air and ground radios will provide pilots access to weather data on SWIM via the Communications Management System and the SWIM Management Unit. SWIM will make weather data available to subscribers based on a policy consistent with the security tenet of permitting access to specific data items only appropriate personnel and organizations access to specific data items.

Benefits

Since controllers and pilots have a common weather picture, safety is enhanced. Distributing a common weather picture to ATC personnel and pilots supports the Collaborative Decision Making process and delegating separation responsibility to the pilot.

Systems

Aeronautical Information Management (key system)

The AIM system represents the evolution of the acquisition, storage, processing and dissemination of aeronautical information in the NAS. Aeronautical information is defined as any information concerning the establishment, condition, or change in any component (facility, service, or procedure of, of hazard) of the National Airspace System. Aeronautical information comes in two types a somewhat static type, and a more dynamic type. The static portion represents the aeronautical information baseline as a particular date, while the dynamic portion updates particular aspects of the static portion due to system impacts or events. The Static portion represents data that NAS automation systems and other users use to adapt their software to properly operate. The dynamic portion represents information typically contained in NOTAMs that indicate short-term changes to the static data.

Many NAS systems support the acquisition, generation, and dissemination of the static aeronautical information. Information of this type includes airspace structures, airways, locations of NAS facilities, inter-facility letters of agreement and memorandums of understanding, obstructions, standard procedures, airspace charts, etc.

Several NAS systems also support the acquisition, generation, processing, and dissemination of the dynamic aeronautical information. Information of this type includes, facility outages, runway closures, temporary flight restrictions, airspace constraints, SIGMETs, etc. This information must be disseminated to users and providers of air traffic services in a timely and efficient manner.

AIM will provide the central point for the dissemination of high quality, configuration controlled information to NAS systems, service providers and users of the NAS. AIM will disseminate data based on the Aeronautical Information Exchange Model (AIXM) protocols.

Air Route Surveillance Radar - Model 3 (key system)

The Air Route Surveillance Radar - Model 3 (ARSR-3) is a 1980s radar that provides primary long range surveillance data, including slant range and azimuth data. It processes the returns which includes demodulation, analog-to-digital conversion, moving target indicator function, sensitivity time control, range and azimuth gating, and digital target extraction - all of which are performed digitally (with the exception of the demodulation and analog-to-digital conversion). In addition, the ARSR-3 has a weather channel with associated processing to provide weather contour information in digital format.

Air Route Surveillance Radar - Model 4 (key system)

The Air Route Surveillance Radar - Model 4 (ARSR-4) is a three-dimensional, long-range, rotating phased array, primary surveillance radar with integrated height finder capability. It is part of the joint surveillance system (JSS) used in conjunction with ARSR-3 coverage as part of the nationwide air defense command surveillance network. In addition to functions peculiar to the military, the ARSR-4 performs the same basic functions of the ARSR-3, by providing primary long-range surveillance data, including slant range and azimuth data.

Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) (key system)

The Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) (ASR-9/Mode S (SLEP)) mechanism provide the necessary technical refresh to extend the service life of the ASR-9 and Mode S through 2030. The ASTERIX upgrade has not been implemented, but will be implemented at a later date.

Automated Radar Terminal System - Model IIIE (key system)

The Automated Radar Terminal System - Model IIIE (ARTS IIIE) consists of the hardware platform and software required providing radar data processing (RDP) and decision support tools to the controller in the terminal environment. The ARTS IIIE is used at consolidated Terminal Radar Approach Control (TRACON) facilities. The Common ARTS program provided an ARTS IIIE capable of receiving input from up to 15 sensors, the ability to process up to 10,000 tracks simultaneously, and support up to 223 displays. The RDP software provides automated surveillance tracking and display processing including mosaic display of radar data. Included in the ARTS IIIE software are decision support tools such as Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Mode C intruder alert, Converging Runway Display Aid (CRDA), Final Monitor Aid (FMA), and controller automation spacing aid.

Automated Surface Observing System Pre-Planned Product Improvement (key system)

The Automated Surface Observing System P3I will improve the automated sensors performance. These include an ASOS processor upgrade, improved dew point sensor, ice-free wind sensor, enhanced precipitation identifier, and a 25,000-foot ceilometer.

Automatic Dependent Surveillance - Broadcast Avionics (key system)

Automatic Dependent Surveillance-Broadcast Avionics (ADS-B Avionics) transmits and receives Global Positioning System (GPS)-derived aircraft 4-dimensional position data, aircraft identification, aircraft velocity, and other selected aircraft data. Augmented GPS data may be required for certain applications. This is intended to be a surveillance system and not an avoidance system. The broadcast of own position is automatic and is intended to provide surveillance information to other users. The aircraft or vehicle originating the broadcast may not have knowledge of which users are receiving its broadcast. The ADS-B avionics are designed to transmit this 4-dimensional position data of own aircraft or vehicle and to also receive same type of information from others that are similarly equipped to receive and process ADS-B surveillance information.

BSGS Broadcast Services Ground Station (key system)

The BSGS (Broadcast Services Ground Station) supports Air-Ground broadcast services. This includes the reception of ADS-B from equipped aircraft/vehicles and the transmission of Traffic Information Service-Broadcast (TIS-B) and Flight Information Service-Broadcast (FIS-B) for use by equipped aircraft. Generally, the BSGS will interface via the SDN to provide ADS-B information to ATC automation and receive TIS-B and FIS-B information from TIS-B and FIS-B servers. The BSGS includes antenna(s), one or more dual link (i.e., 1090 MHz Extended Squitter-1090ES and Universal Access Transceiver-UAT) Ground Based Transceiver(s)(GBT), processing functions and communications functions. Several configurations of the BSGS are required to support variations in the geographic service volume and functions to be supported at specific categories of operational sites. BSGSs will be installed at 448 airports and 100 en route locations. Included are those airports equipped with Secondary Surveillance Radar (SSR) and about 140 additional towered airports (currently without SSR). The BSGS will support ADS-B and TIS-B services via both the 1090ES link and by the UAT link. The BSGS will also support FIS-B via the UAT link. BSGSs incorporate a multilink gateway function that provides ADS-B rebroadcasts via the ADS-B alternate link. A BSGS incorporating 2 GBTs are required for airport surface and terminal surveillance coverage at each of 268 smaller airports, a BSGS incorporating 3 GBTs (on average) are required at 120 of the mid-sized airports, and a BSGS incorporating 6 GBTs (on average) are required at the 60 largest airport (those equipped with ASDE-X or ASDE-3 surface surveillance systems).

The following BSGS functions are required to support the various categories of NAS BSGS sites, except as noted below: (1) 1090ES and UAT receive/transmit (i.e., the GBT funnction); (2) multi-link gateway function; (3) process received ADS-B messages and output (via the SDN) ADS-B reports for use by ATC automation; (4) accept TIS-B and FIS-B information from ground TIS-B/FIS-B servers and manage the generation and broadcast of link specific TIS-B messages via the 1090ES and UAT links and FIS-B messages via the UAT link.

The following BSGS configurations are assumed based on the category of the operational site. Except as noted below all BSGS configuration support the above described functions.

En route (100 sites): (1) One multi-sector antenna with each sector connected to the individual 1090ES and UAT receivers. Supports up to 250 nmi. ADS-B reception. En route locations that are intended to provide only low-altitude gap filler coverage do not require the long-range capability. (2) One omni-directional transmit antenna. Transmitter power sized to support the required TIS-B and FIS-B coverage for that specific site.

Terminal/Airport without ASDE-X (415 airports incl. 27 ASDE-3 equipped airports) with each site having: (1) BSGS with at least 2 GBTs with omni-directional antennas sited for both airport surface and terminal airspace coverage; (2) additional GBTs as needed to provide coverage of the primary airport surface movement area.

Terminal/Airport with ASDE-X (26 ASDE-X plus 7 upgraded ASDE-3 airports with an average of 6 GBTs per BSGS): (1) ASDE-X ground stations upgraded to support GBT functionality; (2) At least two of the GBTs provide ADS-B coverage to the edge of the terminal airspace and the TIS-B coverage; (3) ASDE provides the surveillance data source to support TIS-B for surface traffic.

Cockpit Display of Traffic Information Avionics (key system)

The Cockpit Display of Traffic Information Avionics (CDTI Avionics) is a generic name for a display that provides the flight crew with surveillance information about other proximate aircraft, including their position. It enables pilots to electronically "see and avoid" other aircraft.

Commercial Communications Service Provider (key system)

Commercial Communications Service Provider (CCSP) is a commercial entity who provides communications services for a fee.

Communications Management System (key system)

The CMS Management and Control function performs tasks for overall management and control of all air/ground and ground/ground voice and data communications to support System Wide Information Management (SWIM). CMS will also incorporate a reconfiguration control function to support reconfigurable airspace assignments, data routing, and a digital recording for both voice and data.

The En Route Automation Modernization program has assumed the data recording function via the Standard Automation Platform, and the Digital Voice Recorder System performs the voice recording function. The CMS routing function is a data router that ensures transport of data communications among Air Traffic Control facilities and users of SWIM. Additionally, CMS integrates functionalities inherently provided by the voice switches, the voice recorders, and the ATN Router.

Corridor Integrated Weather System (key system)

The CIWS collects various data, then processes, generates, displays, and distributes convective (thunderstorm) weather products to traffic managers at ATCSCC, certain ARTCCs and large TRACONs, and some large airports. The CIWS receives weather data from multiple sensors (primarily radars) and distributes processed thunderstorm information to NAS traffic managers via the System Wide Information Management (SWIM). This system will consist of a hardware processor and associated displays to be used in the TRACON, ARTCC, and ATCSCC.

Digital Voice Recorder System

Provides modern digital voice recording devices used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

In Feburary 2004, the DVRS was upgraded with a 24-channel card, which replaced the 16-channel card. This minor upgrade, called DVR II, was not extended to the systems installed prior to February 2004.

Digital Voice Recorder System Replacement

The Digital Voice Recorder System Replacement (DVRS Replacement) is a modern digital system used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

Digital- Automated Terminal Information Service SLEP

This extends the life of the D-ATIS.

Display System Replacement (key system)

The Display System Replacement (DSR) provides continuous real-time, automated support to air traffic controllers for the display of surveillance, flight data and other critical control information. This information is processed by the Host and Oceanic Computer System Replacement (HOCSR) and the Enhanced Direct Access Radar Channel (EDARC) subsystems. The DSR provides controller workstations, displays, and input/output devices and a communications infrastructure to connect the DSR with external processing elements of the en route ATC automation system.

Enhanced Aircraft Weather Sensor (key system)

The enhanced aircraft weather sensor provides for the collection of real-time airborne weather data, including turbulence and humidity, from participating aircraft, and integrates the data with other weather products for MAS-wide distribution.

Flight Information System - Data Link (key system)

The Flight Information System - Data Link (FISDL) provides Pilots weather, NOTAM, airfield information and other selected data through a service vendor operating on FAA provided VHF channels. The FISDL service is being facilitated through a FAA/Industry agreement allowing a commercial service provider to offer graphical and textual FIS/weather products to the cockpit of equipped aircraft. This vendor operated service is being provided as a near-term capability consistent with the FAA FIS Policy Statement of 1998. This vendor operated service will be phased out when the FAA is able to offer simliar FISDL services through FAA operated data link resources (e.g., via the UAT link using the BSGS and TIS-FIS Broadcast Server mechanism).

Integrated Terminal Weather System (key system)

The Integrated Terminal Weather System (ITWS) functions as a weather server in the terminal domain. It acquires data from FAA and National Weather Service (NWS) sensors as well as from aircraft in flight in the terminal area. The ITWS will provide aviation-oriented weather products to Air Traffic Control (ATC) personnel that are immediately usable without further meteorological interpretation.

Need mechanism for follow-on to ITWS, e.g., ITWS SLEP. ITWS functionality re wind shear/microburst detection and prediction will have to remain local, not remote such as by GWP. Possibility exists of obtaining convective forecast product (s) from other Wx processors, e.g., GWP, later on.

National Weather Service Workstation (key system)

The National Weather Service Workstation (NWS Workstation) enables the Meteorologist to create and disseminate aviation-related weather products (e.g., SIGnificant METeorological Information (SIGMETS), Terminal Aerodrome Forecasts (TAF), etc.) to the FAA and nearby NWS Weather Forecast Offices. The NWS uses various methods to disseminate these products (e.g., Commercial Communications Service Provider (CCSP), internet, NWS-to-FAA telecommunications gateways, etc) to the FAA.

Next Generation Weather Radar

The Next Generation Weather Radar (NEXRAD) system is a tri-agency (FAA, DoD, & NWS) Doppler weather radar to identify and track heavy precipitation and thunderstorm attribute information such as high wind velocity, hail, tornado, wind shear, precipitation intensity, and echo tops products. Mosaics of multiple NEXRADs are provided to FAA controllers on DSR (from WARP) and to DoD controllers on MicroEARTS (where they control aircraft NAS airspace). NEXRAD mosaics are also sent to traffic managers. Commercial weather vendors also recieve NEXRAD products.

Next Generation Weather Radar Open System (key system)

The Next Generation Weather Radar Open System (NEXRAD Open System) mechanism will upgrade the NEXRAD to an open systems architecture with new hardware, software, and modular configuration. The upgrade will initially increase the radar""s processing capabilities. Subsequent upgrades to the actual radar will reflect radar control via software that enables quicker, tailored scans resulting in more accurate products and improvement to overall system reliability and maintainability.

Operational and Supportability Implementation System (key system)

Operational and Supportability Implementation System (OASIS): The capabilities provided by the OASIS include alphanumeric and graphic weather product acquisition and display, flight plan processing, search and rescue services, and law enforcement support. The OASIS provides a real-time, multi-user, computer-based system that provides current weather information, forecast weather information, Notice to Airmen (NOTAM) information, and flight planning.

OASIS also supports flight service specialists at International Automated Flight Service Stations (IAFSS) that provide services associated with aircraft transiting the oceans.

Power Systems

The Power Systems (Pwr Sys) mechanism provides for the conditioning of commercial power, including uninterruptible power systems (UPS), to eliminate voltage dropouts, surges, and voltage sags caused by sources outside the facility. Power distribution, grounding, bonding and shielding of electrical system within the facility is also part of the Pwr Sys.

The Power Systems (Pwr Sys) mechanism provides the following: 1.) ACEPS Busway Replacements, 2.) ACEPS EG Maintenance, 3.) ACEPS Monitoring & Diagnostics, 4.) ACEPS Fuel System Upgrade, 5.) ACEPS Training, 6.) Battery Monitoring, 7.) Training Facility, 8.) CPDS, 9.) Battery Replacements, 10.) DC Systems, 11.) EG, 12.) LPGBS, 13.) Power Cable, 14.) UPS, 15.) Contract Support.

Standalone Weather Sensors (key system)

The Standalone Weather Sensors (SAWS) is a standalone general support system that provides a backup to ASOS for certain weather parameters at low-level activity (Level C) Air Traffic Control Towers that do not have weather observers. The SAWS system collects, processes, and displays weather data automatically, including wind speed, direction and gust; temperature: relative humidity; and barometric pressure.

System Wide Information Management Build 1A

SWIM provides for National Airspace System (NAS)-wide transport and sharing of information between the Federal Aviation Administration and users. SWIM is a consistent and single point of entry for users to publish and subscribe to NAS data. SWIM provides context-sensitive information to NAS elements that require the information. SWIM replaces many single-focus networks, such as FIRMNet and CDMnet. This build will integrate Aeronautical, Weather, and NAS Resource Status information systems into the SWIM architecture. A SWIM Management Unit, at each facility, will support the sending (publishing) and receiving (subscribing) of data on SWIM and the SDN. A central SWIM Directory Management Unit will maintain a directory of data available for subscription and publication.

System Wide Information Management Build 1B (key system)

Build 1B provides all items in 1A, including more NAS information. This build integrates Flight and Surveillance Information systems into the SWIM architecture.

TIS-FIS Broadcast Server (key system)

TIS-FIS Broadcast Servers are located at 22 Air Route Traffic Control Centers and 8 consolidated Terminal Radar Approach Controls/Integrated Control Complex (ICC). TIS-Broadcast (TIS-B) is needed unless full Automatic Dependent Surveillance-Broadcast equipage is achieved. Servers will receive surveillance data (i.e., based on Secondary Surveillance Radar, etc.), from the Surveillance Data Processor (SDP), in the form of Surveillance Data Objects for each target aircraft and will create TIS-B reports. Servers will receive FIS data from weather processors. The TIS and FIS data will be geographically filtered for the defined service volume of each Broadcast Services Ground Station (BSGS), and TIS data will also be filtered for only non-ADS-B-equipped targets.

Terminal Doppler Weather Radar - Technical Refresh (key system)

The Terminal Doppler Weather Radar technical refresh mechanism funds needed upgrades to the TDWR system. Improvements included replacing the system processor, upgrades to scan tracking (to 360 degree vice sector scan) and Radar Product Generator, Backup Communications, Uninterruptible Power Supply (UPS), modifications to battery, and safety modifications for the antenna.

Terminal Doppler Weather Radar Service Life Extension Program (key system)

The Terminal Doppler Weather Radar Service Life Extension Program (TDWR SLEP) mechanism funds the service live extension efforts to continue operation of the TDWR system. Upgrades include new hardware and re-hosting software for the Digital Signal Processor (DSP), RDA (receiver replacement), replacing antenna motors and hardened elevation drive bullgear/bearings.

Weather Message Switching Center Replacement (WMSCR) Sustain (key system)

The Weather Message Switching Center Replacement (WMSCR) sustainment activity will sustain the existing WMSCR functionality of distributing alphanumeric weather text and NOTAM products through a hardware and software upgrade program. This upgrade program will consist of Commercial-off-the-Shelf processors, physical disk drives, workstations, network routers, printer, operating system, High Order Language programming software, and other commercially available software packages.

Weather Systems Processor (Technological Refresh) (key system)

The Weather Systems Processor (Technological Refresh) (WSP (Tech Refresh)) is a technological refresh of Commercial off-the-Shelf (COTS) equipment procured under the original Airport Surveillance Radar-Weather Systems Processor (ASR-WSP) program. WSP COTS equipment refresh cycle is expected every six (6) to seven (7) years to maintain operational condition of equipment.

Weather and Radar Processor (WARP) Replacement (key system)

The Weather and Radar Processor (WARP) will undergo a hardware and software upgrade to receive, process, display, and disseminate enhanced weather products (i.e., forecasts of thunderstorms)from a variety of sensors to provide tailored weather information to Traffic Managers on briefing terminals and ETMS (TFM-M), En route controllers (DSR), as well as gridded weather data to automation systems (e.g., URET, DOTS+, ATOP, CTAS/TMA/DA, etc). It will provide enhanced forecasting tools to CWSU meteorologists, and enhances weather support to oceanic operations with various forecasts of turbulence, volcanic ash plumes, and thunderstorms in gridded format. It also provides a telecommunications upgrade to support emerging FAA Telecommunications Infrastructure (FTI) services; incorporate enhanced computer security features and provide an organic maintenance capability.

Weather and Radar Processor (Weather and Radar Processor) Stage 3 (key system)

The Weather and Radar Processor (WARP) Stage 3 provides gridded forecast weather data via the Weather Information Network System (WINS) to User Request Evaluation Tool Core Capability Limited Deployment (URET/CCLD), Enhanced Traffic Management System (ETMS), Dynamic Ocean Tracking System - Plus (DOTS-Plus), Advanced Technologies and Oceanic Procedures (ATOP), and Operational and Supportability Implementation System (OASIS).

People

Airline Operations Center Dispatcher

The Airline Operations Center Dispatcher (AOC Dispatcher) is a major airline employee that enters bulk flight plan requests and works with FAA by revising schedules and providing flight cancellations based on FAA provided data

(aggregate demand lists, arrival rates, and parameters for anticipated ground delays.)

Meteorologist

Meteorologists provide accurate and timely weather information for FAA facilities within their area of responsibility. They analyze and interpret real-time weather data from radar, satellites and pilot reports as well as NWS products such as terminal and area forecasts, and in-flight advisories.

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Radar Controller

A Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate automated handoffs; Assist the radar associate controller with non-automated handoff actions when needed; Assist the radar associate controller in coordination when needed; Scan radar display; Correlate with flight progress strip information; Ensure computer entries are completed on instructions or clearances you issue or receive; Ensure strip marking is completed on instructions or clearances you issue or receive.

Supervisory Air Traffic Control Specialist

The supervisor is responsible for overall facility operations during an assigned shift. Duties include ensuring adequate staffing for the operational situation, monitoring operational positions, and ensuring functions are performed in accordance with directives.

Traffic Management Coordinators

Traffic Management Coordinators track and predict traffic flows, analyze ground delays, evaluate alternative routing strategies, and plan local traffic patterns at the local facility (ARTCC, TRACON, or Towers)

Traffic Management Specialist

Traffic Management Specialists perform the following activities: Balance air traffic demand with the airspace's capacity to maintain maximum and efficient utilization of the NAS; Coordinate and implement traffic management directives if needed for area of responsibility; Monitor and balance traffic flows within the area of responsibility in accordance with traffic management directives; Evaluate effectiveness of traffic management directives and make necessary adjustments; Document delay information.

Interfaces

Aeronautical Information Management ← (NAS Status Data) → System Wide Information Management Build 1B

"AIM exchanges NAS Status data, including equipment status, airspace schedules and status, contingency routings, and RNP-RNAV routings, with other systems via SWIM.

Aeronautical Information Management — (Weather Data) → System Wide Information Management Build 1B

AIM provides PIREPS for distribution to NAS users via SWIM.

Air Route Surveillance Radar - Model 4 — (Surveillance Data) → System Wide Information Management Build 1B

The ARSR-4 provides surveillance data to SWIM for distribution to automation systems and other authorized systems and users.

Air Route Surveillance Radar - Model 4 — (Weather Data) → System Wide Information Management Build 1B

The ARSR long-range radar provides detected weather data to SWIM for distribution.

Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) — (Surveillance Data) → System Wide Information Management Build 1B

The ASR-9 provides surveillance data to SWIM for distribution to automation systems and other authorized systems and users.

Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) — (Weather Data) → System Wide Information Management Build 1B

The ASR-9 provides surveillance data to SWIM for distribution to automation systems and other authorized systems and users.

Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) — (Weather Data) → Weather Systems Processor (Technological Refresh)

The ASR-9 weather channel provides 6-level precipitation data to the WSP to support product generation. ASR-WSP products include reflectivity and storm motion, wind shear/microburst alerts, and gust front products. In addition, the WSP will display ASR-9 reflectivity data (similar to ITWS) in standard NWS six-level color presentation after removing any anomalous propagation (false weather radar returns) that may be present.

Automated Surface Observing System Pre-Planned Product Improvement — (Weather Data) → Terminal Doppler Weather Radar - Technical Refresh

The ASOS sends wind speed/direction and wind gust data to the TDWR.

Automated Surface Observing System Pre-Planned Product Improvement — (Weather Data) → Terminal Doppler Weather Radar Service Life Extension Program

The ASOS sends wind speed/direction and wind gust data to the TDWR.

Automated Surface Observing System Pre-Planned Product Improvement — (Weather Data) → Weather Message Switching Center Replacement (WMSCR) Sustain

This interface supplies surface observation data (e.g., wind, temperature, visibility, and precipitation) to Weather Message Switching Center Replacement (WMSCR).

Automated Surface Observing System Pre-Planned Product Improvement — (Weather Data) → Weather Systems Processor (Technological Refresh)

The ASOS sends wind speed/direction and wind gust data to the WSP.

Automatic Dependent Surveillance - Broadcast Avionics ← (Target Data) → Automatic Dependent Surveillance - Broadcast Avionics

Air-to-air ADS-B target data is exchanged between aircraft for use initially as a situation awareness enhancement. This capability will be expanded to other future applications, such as precision approach and landing and self separation.

Automatic Dependent Surveillance - Broadcast Avionics ← (Target Data) → BSGS Broadcast Services Ground Station

The GBT intercepts ADS-B transmissions from aircraft in the coverage area of the GBT. The GBT transmits ADS-B reports it receives down the UAT link back up the 1090 link and vice versa.

Automatic Dependent Surveillance - Broadcast Avionics — (Target Data) → Cockpit Display of Traffic Information Avionics

The ADS-B avionics provides the flight crew surveillance information about other aircraft in the area and is displayed on the CDTI. This information is initially used for enhanced situation awareness and will be expanded to other future applications such as precision approach and landing and self separation.

BSGS Broadcast Services Ground Station — (Weather Data) → Automatic Dependent Surveillance - Broadcast Avionics

ADS-B Avionics (with weather application) can receive FIS weather products broadcasted by the BSGS via an ADS-B data link.

BSGS Broadcast Services Ground Station — (Surveillance Data) → System Wide Information Management Build 1B

The GBT provides ADS-B reports to the SDN for distribution to automation systems and other authorized systems and user.

BSGS Broadcast Services Ground Station ← (Target Data) → TIS-FIS Broadcast Server

The TIS-FIS Broadcast Server exchanges data with the BSGS to form a surveillance broadcast reports, which are then broadcasted to users via the BSGS.

Communications Management System ← (Data Communication) → Communications Management System

Controllers in the same or different facilities communicate via CMS.

Communications Management System ← (Voice Communication) → Communications Management System

Controllers in the same or different facilities communicate via CMS.

Corridor Integrated Weather System — (Weather Data) → Weather and Radar Processor (WARP) Replacement

CIWS passes convective forecast products to WARP for CWSU display and forwarding (to various users) via WARP WINS.

Integrated Terminal Weather System — (Weather Data) → Integrated Terminal Weather System

The Integrated Terminal Weather System NFU located in the ATCSCC provides site-specific MDCRS and Rapid Update Cycle (RUC) forecast data to the other ITWS Product Generators which provide tailored products to Towers and TRACONs in CONUS and Puerto Rico.

Integrated Terminal Weather System ← (Weather Data) → System Wide Information Management Build 1B

ITWS publishes and subscribes to weather data on SWIM.

Integrated Terminal Weather System — (Weather Data) → TIS-FIS Broadcast Server

ITWS provides graphical weather information to the TIS-FIS Broadcast Server for processing pior to being sent to the BSGS for broadcasting.

Next Generation Weather Radar Open System — (Weather Data) → Corridor Integrated Weather System

NEXRAD provides radar base data (not products) to CIWS.

Next Generation Weather Radar Open System — (Weather Data) → System Wide Information Management Build 1B

NEXRAD publishes weather data on SWIM.

Next Generation Weather Radar Open System — (Weather Data) → Weather and Radar Processor (WARP) Replacement

The NEXRAD transmits precipitation, hail, and tornado products to the WARP

Next Generation Weather Radar Open System — (Weather Data) → Weather and Radar Processor (Weather and Radar Processor) Stage 3

The NEXRAD (Mod Open System, upgrades the processing and dissemenation abilities to provide higher resolution radar products to WARP, as well as FAA-tailored products. Later Mods upgrade the radar to provide enhanced precip identification/precip type (e.g., freezing rain, snow, etc) via dual polar beam formation.

System Wide Information Management Build 1B — (Surveillance Data) → Automated Radar Terminal System - Model IIIE

The SDN distributes surveillance data received from various sensors to NAS automation systems.

System Wide Information Management Build 1B — (Flight Data) → BSGS Broadcast Services Ground Station

FOMS provides the flight object to the GBT for transmission to aircraft via SWIM.

System Wide Information Management Build 1B — (NAS Status Data) → BSGS Broadcast Services Ground Station

"The GBT receives NAS Status Data, including NOTAMS, via SWIM for broadcast to aircraft equipped with UAT communication equipment.

System Wide Information Management Build 1B — (Data Communication) → Communications Management System

Pilots can access data available on SWIM via radios and CMS.

System Wide Information Management Build 1B — (Weather Data) → Operational and Supportability Implementation System

OASIS subscribes to weather data on SWIM.

TIS-FIS Broadcast Server — (Weather Data) → BSGS Broadcast Services Ground Station

FIS graphical weather products from the TIS-FIS Broadcast Server are sent to the BSGS for broadcasting.

Terminal Doppler Weather Radar - Technical Refresh — (Weather Data) → Integrated Terminal Weather System

TDWR provides microburst, gust front, runway oriented threshold winds, and center field wind products to the ITWS. Plus, base radar data and LLWAS-NE products will be merged by ITWS with data from other terminal weather sensors to develop ITWS weather products.

Terminal Doppler Weather Radar - Technical Refresh — (Weather Data) → System Wide Information Management Build 1B

TDWR publishes weather data on SWIM.

Terminal Doppler Weather Radar Service Life Extension Program — (Weather Data) → System Wide Information Management Build 1B

TDWR publishes weather data on SWIM.

Weather Message Switching Center Replacement (WMSCR) Sustain ← (Weather Data) → Operational and Supportability Implementation System

The WMSCR provides NOTAMS and alphanumeric weather products to OASIS.

Weather Message Switching Center Replacement (WMSCR) Sustain — (Weather Data) → System Wide Information Management Build 1B

WMSCR publishes weather data on SWIM.

Weather Systems Processor (Technological Refresh) — (Weather Data) → System Wide Information Management Build 1B

WSP publishes weather data on SWIM.

Weather and Radar Processor (WARP) Replacement — (Weather Data) → Display System Replacement

This interface provides an enhanced NEXRAD radar mosaic of precipitation intensity for three vertical layers, plus a combined layer product, to DSR.

Weather and Radar Processor (WARP) Replacement — (Weather Data) → Integrated Terminal Weather System

The WARP (Tech Refresh) and ITWS exchanges weather products to help terminal controllers assist aircrews in avoiding hazardous weather and traffic managers for contingency planning.

Weather and Radar Processor (WARP) Replacement — (Weather Data) → Operational and Supportability Implementation System

This upgrade enables WARP to provide the Operational and Supportability Implementation System (OASIS) with weather data (alphanumeric and graphic weather products). This will aid the Flight Service Specialist in flight planning services to the user.

Weather and Radar Processor (WARP) Replacement — (Weather Data) → System Wide Information Management Build 1B

WARP publishes weather data on SWIM.

Weather and Radar Processor (WARP) Replacement — (Weather Data) → TIS-FIS Broadcast Server

WARP provides graphical weather information to the TIS-FIS Broadcast Server for processing prior to being sent to the BSGS for broadcasting.

Weather and Radar Processor (Weather and Radar Processor) Stage 3 — (Weather Data) → Display System Replacement

This interface provides an enhanced NEXRAD radar mosaic of precipitation intensity for three vertical layers, plus a combined layer product, to DSR.

Issues

Currently, WMSCR is undergoing a Tech Refresh to enable it to function through 2010/11. SWIM must subsume its functionality by then. From a SWIM perspective, what physically will be in place to subsume WMSCR functionality?

Service Group Air Traffic Services

Service ATC-Separation Assurance

Capability Aircraft Airspace Capability

Operational Improvement

Manage Aircraft in Dynamic Airspace (102302)

The value of the nation's airspace for all users becomes increasingly critical as military operations, domestic commercial operations, general aviation, and, finally, space transportation vie for airspace. Airspace use/availability information is dynamic for both users and service providers; it allows them to react to available airspace to enhance flight operations for both mission and economic priorities. Automated systems provide users of properly equipped aircraft streaming information that include, for example, air traffic control clearance, current and forecast weather, notices to airmen, hazardous weather, airspace-related charts, and status of special use airspace (SUA). Airspace is designated for special use for all aviation users based on priority and availability of use. Information on SUA is widely available and highly dynamic as far as start and end times of the defined SUAs

01-Jan-2018 to 31-Jan-2023

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

The value and availability of the nation's airspace for all users become increasingly critical as military operations, domestic commercial operations, general aviation, and, finally, space transportation vie for airspace. Both users and service providers can access information on airspace use/availability through the Aeronautical Information Manual (AIM) and System Wide Information Management (SWIM) system to enhance flight operations for both mission and economic priorities. The first step is to integrate the airspace reservation and management information from AIM into the Flight Object Management System (FOMS) and into the Standard Automation Platform (SAP). These reservations are automatically depicted as volumes with start times and duration within FOMS so that the service provider can receive alerts on any imminent incursion into the airspace. The volumes are also represented visually on the SAP workstation at a time before activation and throughout the reservation time to provide visual representation of the dynamic airspace to the service provider. If the dynamic airspace includes new sectorizations, the flight data management system updates the current adaptation settings to provide automatic point-outs and the handoff coordination.

As the designation of airspace for reusable launch vehicles, remotely operated aircraft, and military use evolves to a "flight plan" with trajectories and protected volumes, the SAP human-machine interface is updated to provide visual representations of the volumetric separation requirement, including current and future states. The user has access to changes in airspace in the AIM via SWIM.

Benefits

The benefits of this operational improvement include: Increased productivity by providing the procedures and tools to allow service-provider volume to be adjusted to changes in flow without impacting the workload associated with separation assurance. Improved the overall average flight efficiency by assigning volumes and setting reservation of special use airspace based on the expected flow for the day without impacting the workload associated with separation assurance. Increased flight efficiency by supporting the service provider in detecting dynamic airspace intersections and developing efficient resolutions

Systems

Aeronautical Information Management (key system)

The AIM system represents the evolution of the acquisition, storage, processing and dissemination of aeronautical information in the NAS. Aeronautical information is defined as any information concerning the establishment, condition, or change in any component (facility, service, or procedure of, of hazard) of the National Airspace System. Aeronautical information comes in two types a somewhat static type, and a more dynamic type. The static portion represents the aeronautical information baseline as a particular date, while the dynamic portion updates particular aspects of the static portion due to system impacts or events. The Static portion represents data that NAS automation systems and other users use to adapt their software to properly operate. The dynamic portion represents information typically contained in NOTAMs that indicate short-term changes to the static data.

Many NAS systems support the acquisition, generation, and dissemination of the static aeronautical information. Information of this type includes airspace structures, airways, locations of NAS facilities, inter-facility letters of agreement and memorandums of understanding, obstructions, standard procedures, airspace charts, etc.

Several NAS systems also support the acquisition, generation, processing, and dissemination of the dynamic aeronautical information. Information of this type includes, facility outages, runway closures, temporary flight restrictions, airspace constraints, SIGMETs, etc. This information must be disseminated to users and providers of air traffic services in a timely and efficient manner.

AIM will provide the central point for the dissemination of high quality, configuration controlled information to NAS systems, service providers and users of the NAS. AIM will disseminate data based on the Aeronautical Information Exchange Model (AIXM) protocols.

Air Route Surveillance Radar - Model 1E

The Air Route Surveillance Radar - Model 1E (ARSR-1E) is a 1970s analog radar. It is a long-range radar system with a maximum detection range of 200 nm. The ARSR-1E is a surveillance system used to detect azimuth and slant range of en route aircraft operating between terminal areas. It also provides weather intensity data.

Air Route Surveillance Radar - Model 2

The Air Route Surveillance Radar - Model 2 (ARSR-2) is a 1970s analog radar. It is a long-range radar system with a maximum detection range of 200 nm. The ARSR-2 is a surveillance system used to detect azimuth and slant range of en route aircraft operating between terminal areas. It also provides weather intensity data.

Air Route Surveillance Radar - Model 3

The Air Route Surveillance Radar - Model 3 (ARSR-3) is a 1980s radar that provides primary long range surveillance data, including slant range and azimuth data. It processes the returns which includes demodulation, analog-to-digital conversion, moving target indicator function, sensitivity time control, range and azimuth gating, and digital target extraction - all of which are performed digitally (with the exception of the demodulation and analog-to-digital conversion). In addition, the ARSR-3 has a weather channel with associated processing to provide weather contour information in digital format.

Air Route Surveillance Radar - Model 4

The Air Route Surveillance Radar - Model 4 (ARSR-4) is a three-dimensional, long-range, rotating phased array, primary surveillance radar with integrated height finder capability. It is part of the joint surveillance system (JSS) used in conjunction with ARSR-3 coverage as part of the nationwide air defense command surveillance network. In addition to functions peculiar to the military, the ARSR-4 performs the same basic functions of the ARSR-3, by providing primary long-range surveillance data, including slant range and azimuth data.

Air Traffic Control Beacon Interrogator - Model 6

The Air Traffic Control Beacon Interrogator Model 6 (ATCBI-6) is a ground-based system that interrogates transponders, receives and processes replies from transponders, determines the range and azimuth to the aircraft, and forwards the information to appropriate air traffic control (ATC) automation systems. Replies provide identification and altitude data of the transponder.

Airport Surveillance Radar - Model 11

The Airport Surveillance Radar- Model 11 (ASR-11) is a digital, combined primary and secondary surveillance radar (SSR), short-range radar system with a 60 nautical mile (nmi) detection range for medium and small activity airports. The ASR-11 provides advanced digital primary radar including weather intensity surveillance with an integrated monopulse SSR system for use in the airport terminal area. The ASR-11 is used to detect and report the presence and location of an aircraft in a specific volume of airspace. The ASR-11 provides search radar surveillance coverage in controlled airspace primarily in terminal areas.

Airport Surveillance Radar - Model 7

The Airport Surveillance Radar - Model 7 (ASR-7) is a short-range (60 nm) analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the Air Traffic Control Beacon Interrogator - Model 4 or Model 5 (ATCBI-4 or ATCBI-5) or Mode S. This system will be replaced by the ASR-11.

Airport Surveillance Radar - Model 8

The Airport Surveillance Radar - Model 8 (ASR-8) is a short-range (60 nm), analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the Air Traffic Control Beacon Interrogator - Model 4 or Model 5 (ATCBI-4 or ATCBI-5) or Mode S.

Airport Surveillance Radar - Model 9

The Airport Surveillance Radar - Model 9 (ASR-9) is a short range (60 nm) radar system for the airport terminal area. The ASR-9 processes the returns from aircraft targets, which includes demodulation, analog-to-digital conversion, range and azimuth gating, sensitivity timing control, and a moving target detection function. The moving target detector includes two-level weather contour processing, digital signal processing, correlation and interpolation processing, and surveillance processing. The ASR-9 has a separate weather channel with associated processing capable of providing six-level weather contours. The two-level weather contour processing associated with the moving target detector is only be used for backup. The six-level weather channel is primarily used to supplement Next Generation Weather Radar (NEXRAD) coverage. It is normally used in conjunction with Mode Select (Mode S) but it can accommodate an Air Traffic Control Beacon Interrogator Model 4/5 (ATCBI-4/5).

The ASR-9 will be upgraded/replaced with the ASR-9/Mode S SLEP (see separate mechanism) in the 2007-12 time frame.

Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program)

The Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) (ASR-9/Mode S (SLEP)) mechanism provide the necessary technical refresh to extend the service life of the ASR-9 and Mode S through 2030. The ASTERIX upgrade has not been implemented, but will be implemented at a later date.

BSGS Broadcast Services Ground Station (key system)

The BSGS (Broadcast Services Ground Station) supports Air-Ground broadcast services. This includes the reception of ADS-B from equipped aircraft/vehicles and the transmission of Traffic Information Service-Broadcast (TIS-B) and Flight Information Service-Broadcast (FIS-B) for use by equipped aircraft. Generally, the BSGS will interface via the SDN to provide ADS-B information to ATC automation and receive TIS-B and FIS-B information from TIS-B and FIS-B servers. The BSGS includes antenna(s), one or more dual link (i.e., 1090 MHz Extended Squitter-1090ES and Universal Access Transceiver-UAT) Ground Based Transceiver(s)(GBT), processing functions and communications functions. Several configurations of the BSGS are required to support variations in the geographic service volume and functions to be supported at specific categories of operational sites. BSGSs will be installed at 448 airports and 100 en route locations. Included are those airports equipped with Secondary Surveillance Radar (SSR) and about 140 additional towered airports (currently without SSR). The BSGS will support ADS-B and TIS-B services via both the 1090ES link and by the UAT link.

The BSGS will also support FIS-B via the UAT link. BSGSs incorporate a multilink gateway function that provides ADS-B rebroadcasts via the ADS-B alternate link. A BSGS incorporating 2 GBTs are required for airport surface and terminal surveillance coverage at each of 268 smaller airports, a BSGS incorporating 3 GBTs (on average) are required at 120 of the mid-sized airports, and a BSGS incorporating 6 GBTs (on average) are required at the 60 largest airport (those equipped with ASDE-X or ASDE-3 surface surveillance systems).

The following BSGS functions are required to support the various categories of NAS BSGS sites, except as noted below: (1) 1090ES and UAT receive/transmit (i.e., the GBT funnction); (2) multi-link gateway function; (3) process received ADS-B messages and output (via the SDN) ADS-B reports for use by ATC automation; (4) accept TIS-B and FIS-B information from ground TIS-B/FIS-B servers and manage the generation and broadcast of link specific TIS-B messages via the 1090ES and UAT links and FIS-B messages via the UAT link.

The following BSGS configurations are assumed based on the category of the operational site. Except as noted below all BSGS configuration support the above described functions.

En route (100 sites): (1) One multi-sector antenna with each sector connected to the individual 1090ES and UAT receivers. Supports up to 250 nmi. ADS-B reception. En route locations that are intended to provide only low-altitude gap filler coverage do not require the long-range capability. (2) One omni-directional transmit antenna. Transmitter power sized to support the required TIS-B and FIS-B coverage for that specific site.

Terminal/Airport without ASDE-X (415 airports incl. 27 ASDE-3 equipped airports) with each site having: (1) BSGS with at least 2 GBTs with omni-directional antennas sited for both airport surface and terminal airspace coverage; (2) additional GBTs as needed to provide coverage of the primary airport surface movement area.

Terminal/Airport with ASDE-X (26 ASDE-X plus 7 upgraded ASDE-3 airports with an average of 6 GBTs per BSGS): (1) ASDE-X ground stations upgraded to support GBT functionality; (2) At least two of the GBTs provide ADS-B coverage to the edge of the terminal airspace and the TIS-B coverage; (3) ASDE provides the surveillance data source to support TIS-B for surface traffic.

Communications Management System (key system)

The CMS Management and Control function performs tasks for overall management and control of all air/ground and ground/ground voice and data communications to support System Wide Information Management (SWIM). CMS will also incorporate a reconfiguration control function to support reconfigurable airspace assignments, data routing, and a digital recording for both voice and data.

The En Route Automation Modernization program has assumed the data recording function via the Standard Automation Platform, and the Digital Voice Recorder System performs the voice recording function. The CMS routing function is a data router that ensures transport of data communications among Air Traffic Control facilities and users of SWIM. Additionally, CMS integrates functionalities inherently provided by the voice switches, the voice recorders, and the ATN Router.

Digital Airport Surveillance Radar

The Digital Airport Surveillance Radar (DASR) provides advanced digital primary radar including weather intensity surveillance with an integrated mono-pulse Secondary Surveillance Radar (SSR) system for use in the airport terminal area. (Military version of ASR-11)

Digital Voice Recorder System Replacement

The Digital Voice Recorder System Replacement (DVRS Replacement) is a modern digital system used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

En Route Next Generation Secondary Surveillance Radar

En Route Next Generation Secondary Surveillance Radar (En Route (NEXGEN SS-ER)) is a future generation surveillance system capable of providing cooperative surveillance capabilities commensurate with the technology at the time.

Fixed Position Surveillance - Model 117

The Fixed Position Surveillance - Model 117 (FPS-117) radar is a joint-use military surveillance system used by the FAA to detect slant range and azimuth of en route aircraft. These radars are located in Alaska (12) and Hawaii (1), and are expected to be sustained until at least 2020.

Fixed Position Surveillance Model 20 Series

The Fixed Position Surveillance Model 20 Series (FPS-20 Series) is a military primary radar of various models (FPS-20A, FPS-64, FPS-66A, FPS-67/A/B, and ARSR-60M) used by the FAA to detect slant range and azimuth of en route aircraft operating between terminals in the continental United States. Each of the different radar models is a similar variation of the original FPS-20 military radar.

Flexible Voice Switch (key system)

Voice communications is the primary means of communications among ATC facilities and between an Air Traffic Control Specialist (ATCS) and a pilot. Voice switching provides the ATCS both G/G Interfacility/Intrafacility and A/G voice communications connectivity. The NAS Voice Switch (NVS) program will replace aging voice switches and their analog interfaces with modern digital voice switches consisting of digital interfaces. The Flexible Voice Switch will be the common platform and baseline voice switch for all NAS domains with modularity and scalability to meet communications connectivity requirements. Additionally, this switch will be expandable to accommodate growth capacity requirements and able to support NAS Modernization needs as described in various Operational Improvements.

Flight Object Management System - Terminal (key system)

The FOMS is a component of the Standard Automation Platform (SAP). The FOMS processes flight data received from multiple sources via the System Wide Information Management (SWIM) Management Unit. The FOMS also receives track data from the Surveillance Data Processor (SDP) and associates tracks with flight data, producing the flight object, which is published to SWIM for subscriber use. Flight plan support functionality includes end-to-end profile evaluation in all phases of flight and evaluation against static and dynamic constraints (terrain, obstacles, airspace restrictions, etc.). The FOMS supports flight planning up to 180 days prior to day of flight. A user can access the flight object from initial to closeout in the same manner. The FOMS provides end-to-end flight data management from preflight to post analysis. Ownership of the flight object begins and ends with Traffic Flow Management and transitions during the flight to clearance delivery, ramp, surface, departure, transition to cruise, cruise, transition to arrival, and ramp. Flight data management is based on trajectory, assigned volumes, and "necessary" route structure.

Heating, Ventilation and Air Conditioning - Long-Range Radar

The Heating, Ventilation and Air Conditioning - Long-Range Radar (HVAC - LRR) mechanism provides the systems to maintain the temperature and relative humidity within the facility at acceptable levels for LRR system operation or personnel comfort as required. This includes filtering of air to Occupational Safety and Health Administration (OSHA) requirements.

High Frequency Ground Radios

High Frequency (HF) Ground Radios are analog HF radio devices operating in the 2 - 30 Mhz frequency band, which may be single channel transmitters and receivers or multi-channel transceivers. These radio devices are installed at oceanic and en route facilities and used to support tactical air traffic control (ATC) voice communications between a ground controller and a pilot in an aircraft in the oceanic domain. Additionally, these devices are also installed at regional facilities and used to support voice command and control communications /coordination in emergency or during disaster recovery situations occurring in the NAS.

Integrated Information Workstation - Build 1 (key system)

IIW Build 1 will include the infrastructure and system interfaces to acquire, analyze, store, update, display, and manage the following information in an integrated manner: (1) National Airspace System (NAS) aeronautical, (2) airport environmental, (3) airborne and surface surveillance, (4) flight information, (5) weather information, and (6) NAS status. Build 1 will also replace its predecessor system, FAA Data Display System, as well as interface with the following systems in support of its mission: Flight Object Management, System Wide Information Management, Next Generation- Traffic Flow Management, Maintenance Management System, Unified Decision Management System, and Aeronautical Information Management.

Integrated Information Workstation - Build 2

Build 2 will incorporate new hardware technology and software enhancements through a technical refresh program.

Low-Density Radio Communications Link

The Low-Density Radio Communications Link (LDRCL) is an FAA owned Low-Density Radio Communications Link (LDRCL) satisfies short-haul, low-density communication requirements. It provides user access (via tail circuits) to a Radio Communications Link (RCL) site or connectivity between two operational facilities

Multi-Mode Digital Radios

Multi-Mode Digital Radios (MDRs) are ground-based Very High Frequency (VHF) air-traffic-control radios that can operate in several configurations: 1) analog voice with 25kHz channel spacing; 2) analog voice with 8.33 kHz channel spacing; and 3) VHF Data Link (VDL) Mode-3 which consists of two-way digital voice and data communication.

New Terminal Radar (key system)

The New Terminal Radar (New Terminal Radar) replaces existing terminal radar systems with new radars that incorporates primary and secondary surveillance and Doppler weather radar capability.

Since ADS-B may be used in lieu of secondary surveillance at some locations, the New Terminal Radar will include just the primary surveillance and Doppler weather radar capabilities at those locations. The determination of these locations will depend on the outcome of ADS-B investment decisions, as yet TBD.

Next Generation Traffic Flow Management (key system)

The Next Generation Traffic Flow Management (NG-TFM) system provides an array of automation and data processing tools for Traffic Management Specialists (TMS) and Traffic Management Coordinators (TMC), as well as a gateway that enables NAS users to make changes in flight schedules based on planned traffic initiatives (e.g., Ground Delay Programs) and other NAS data. This enhanced decision support system provides increased information exchange between FAA service providers and NAS users. NG-TFM receives flight schedules from NAS users (e.g., air carriers) and combines these with weather data, NAS status data, and planned traffic initiatives to generate detailed graphical and textual traffic displays as far as 24 hours into the future on both national and local scales. Features include both pre-flight and post-flight analysis tools, flight data archiving, enhanced traffic displays, traffic strategy (one or more initiatives) automation, "what if" strategy analysis, and automated TFM training tools.

NG-TFM is comprised of five different software component systems and will include a hardware and operating system software tech refresh. The complete NG-TFM software package includes changes to support interfaces with the Flight Object Management System (FOMS) and System Wide Information Management (SWIM). When complete, this will establish a new NG-TFM system baseline.

Radio Communication Link

Radio Communication Link (RCL) is an integrated voice and data microwave transmission system designed to provide the FAA with cost effective and reliable service for its high capacity NAS communications routes. RCL interconnects air route traffic control center (ARTCC) facilities with long range radar installations and other air traffic control (ATC) facilities.

Satellite Communication Ground Radios

Satellite Communications (SATCOM) Ground Radios are transceivers installed at oceanic and en route facilities to support an alternative means of tactical air traffic control (ATC) voice communications between ground controllers and pilots in aircraft. These transceivers are typically used in transoceanic applications. These transceivers are also installed at regional facilities and used as an alternate means of communications in case of total ground communications failure or between locations in mountainous terrain or where other means of communications are not possible (e.g., Alaska).

Oceanic air to ground satellite communications are provided via a communications service provider. The FAA currently has no plans to develop or implement its own air to ground SATCOM ground radios.

Standard Automation Platform Convergence Phase 1 (key system)

The purpose of Standard Automation Platform Convergence Phase 1 (SAP Conv P1) is to reduce both procurement and recurring costs by standardizing and sharing as many hardware and software ATC Automation components as possible.

An engineering convergence task will begin in fiscal year 2005 and run through 2015. All components from each of the automation systems (STARS, ERAM, TFM, etc.) will be analyzed, and the "best of breed" and "core" components will be selected. SAP convergence will be performed in the following areas: (1) Hardware; (2) System Software (operating systems, Commercial-Off-The-Shelf tools, etc.); (3) ATC applications that can be shared across domains; (4) ATC applications that are unique to a domain; and (5) ATC system support tools that can be shared across domains (adaptation, data extraction or systems analysis recording, data reduction and analysis tools, etc.). Proven STARS and ERAM components will be slected, integrated into the SAP, and rigorously tested for replacing STARS and ERAM components at or near their end of service life.

Prototyping begun under Phase 1 will continue with SAP Conv P2. The results of both efforts will lead to refining the requirements to develop the SAP WS mechanism with SDP and FOMS applications.

Standard Automation Platform Convergence Phase 2

Standard Automation Platform Convergence Phase 2 (SAP Conv P2) continues with prototyping started under Phase 1 to insure that recurring and technical refresh costs for ATC automation elements are minimized by using as many common components as prossible.

SAP Phase 2 incorporates upgrades and technical refreshes of ATC applications, systems software, and hardware to ensure use of common elements across the terminal, enroute, oceanic, command center, and airport surface ATC Automation domains.

Prototyping will conclude with Phase 2, and the results will lead to refining the requirements for development of the SAP WS mechanism with SDP and FOMS applications.

Standard Automation Platform Remote Workstation Phase 1 (key system)

The SAP RW provides the controller in the tower and the specialist in Flight Advisory Services an interface to the Flight Object Management System and Surveillance Data Processor. The workstation additionally provides the tower controller a display of arrival/departure surveillance data.

Standard Automation Platform Workstation Phase 1 (key system)

The SAP consists of the Flight Object Management System (FOMS), the Surveillance Data Processor (SDP), and the SAP Workstation. The SAP will be installed in En Route and Arrival/Departure facilities. The SDP performs surveillance data processing and tracking on Surveillance Data Objects received from the Surveillance Data Network. The FOMS performs flight plan processing, associates flight and track data, and publishes the Flight Object on the System Wide Information Management network. The SAP workstation provides the controller interface for the FOMS and SDP.

Standard Automation Platform Workstation Phase 2

Provides a Technical Refresh of SAP Workstation Phase 1. The SAP consists of the Flight Object Management System (FOMS), the Surveillance Data Processor (SDP), and the SAP Workstation. The SAP will be installed in En Route and Arrival/Departure facilities. The SDP performs surveillance data processing and tracking on Surveillance Data Objects received from the Surveillance Data Network (SDN). The FOMS performs flight plan processing, associates flight and track data, and publishes the Flight Object on the System Wide Information Management network. The SAP workstation provides the controller interface for the FOMS and SDP.

Surveillance Data Network (key system)

National Airspace System (NAS) surveillance systems, including radar and automatic dependent surveillance systems will provide surveillance data objects via the Surveillance Data Network (SDN), which is a sub-network of the System Wide Information Management (SWIM) and the FAA Telecommunication Infrastructure (FTI). The published Surveillance Data Objects (SDO) will be made available to NAS and other users, including the Transportation Security Administration, Department of Defense, and others. Surveillance data availability supports 3-mile separation standards, gate-to-gate traffic management, seamless airspace, and dynamic resectorization. Improved surveillance information is provided in a timely and consistent manner seamlessly across the NAS for operations, planning, and decision making. The information will be available to all users and service providers via SDO in near real time. This information enables decisions to be based on a shared common view of situations, even as conditions are changing. Improved surveillance with SDOs will provide the automation higher quality of data for seamless surveillance and, in combination with other capabilities and new procedures, enable capacity and safety improvements. These benefits accrue from increased situation awareness by decision makers and improved operation of decision support and analysis tools that use surveillance information.

Surveillance Data Processor (key system)

SDP is a component of SAP and operates in En Route and Terminal. The SDP will make improvements to sensors and automation systems that will allow for expanded use of 3-mile separation and terminal procedures. The operational improvements enable more efficient control of aircraft and use of airspace. To accomplish this, all 1030/1090 Beacon interrogators will be upgraded to disseminate their existing 1.2 milli-radian azimuth accuracy and other information, such as time of measurement, confidence, quality, and so on. The automation system algorithms will be improved or new algorithms will be developed to exploit the additional information content of the improved surveillance reports. The method of presentation (display) to support 3-mile separation will be developed and tested to ensure safety. The existing long-range sensor surveillance update period is (12 seconds) and is insufficient to support 3-mile separation. In areas where only long-range sensors exist and where the Air Traffic Service requires 3-mile separation, these sensors may be modified to double the update rate to achieve 3-mile separation.

System Wide Information Management Build 1B (key system)

Build 1B provides all items in 1A, including more NAS information. This build integrates Flight and Surveillance Information systems into the SWIM architecture.

Ultra High Frequency Airborne Radios

The Ultra High Frequency Avionics (UHF Avionics) are analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225-400 MHz frequency band, which are multi-channel transceivers, installed in an airborne military platform. These airborne devices support the tactical two-way voice communications/ coordination between the military pilot in the military aircraft and the controller on the ground.

Ultra High Frequency Ground Radios - Replacement

The Ultra High Frequency Ground Radios - Replacement (UHF Ground Radios - Repl) mechanism represents analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 MHz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and Flight Service Station domains.

Very High Frequency Ground Radios

Very High Frequency (VHF) Ground Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 MHz frequency band which are single-channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the pilot in commercial, cargo, or general aviation aircraft in the oceanic, en route (i.e., ARTCC), terminal (i.e., TRACON/tower), and flight service station domains. Additionally, there are analog VHF frequency modulation (VHF - FM) radio devices operating in the 161 - 174 MHz frequency band that are multi-channel transceivers. These transceivers are used by flight inspection, aviation security, and airway facility specialists supporting local airport operations and maintenance or to perform their operational maintenance mission in support of the NAS. However, these same VHF-FM transceivers are also used to support the resolution of emergency situations or establish a level of voice command and control communications/coordination during disaster recovery.

Voice Switching and Control System Modification (Technological Refresh) (key system)

The Tech Refresh for VSCS is a service life extension. The Tech Refresh encompasses workstation upgrade, video display monitor, control equipment power, VSCU supportability, control shelf power supply, and software development demonstration system expansion.

Support Activities

AT Procedure Development for Separating Aircraft From Dynamic Airspace

Air Traffic Procedures document air traffic services and how they are implemented. The introduction of new systems, or changes to existing systems, may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

AT Training for Separating Aircraft From Dynamic Airspace

Air Traffic (AT) training is provided to the AT workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AT Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

FAA Airspace Design for Separating Aircraft From Dynamic Airspace

FAA Airspace Design provides the aviation community the description, operational composition, and status of airspace/airport components of the NAS. Generally, airspace design begins six months prior to Initial Operating Capability.

FAA Standards for Separating Aircraft From Dynamic Airspace

FAA standards development is an activity necessary to support people and systems in the delivery of NAS services. FAA Standards establish rules for the measure of quantity, weight, extent, value, or quality.

People

Non-Radar Controller

A Non-Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate transfer of control, communications, and flight data; Ensure computer entries are completed on instructions or clearances issued or received; Ensure strip marking is completed on instructions or clearances issued or received.

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Planning Controller

A Planning Controller performs the following activities: Ensure separation; Initiate control instructions; Operate interphones; Conduct air/ground communications via data link; Coordinate tactical traffic flows; Scan flight data; Correlate with situation data; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the tactical controller when aware of those instructions.

Radar Controller

A Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate automated handoffs; Assist the radar associate controller with non-automated handoff actions when needed; Assist the radar associate controller in coordination when needed; Scan radar display; Correlate with flight progress strip information; Ensure computer entries are completed on instructions or clearances you issue or receive; Ensure strip marking is completed on instructions or clearances you issue or receive.

Traffic Management Coordinators

Traffic Management Coordinators track and predict traffic flows, analyze ground delays, evaluate alternative routing strategies, and plan local traffic patterns at the local facility (ARTCC, TRACON, or Towers)

Traffic Management Specialist

Traffic Management Specialists perform the following activities: Balance air traffic demand with the airspace's capacity to maintain maximum and efficient utilization of the NAS; Coordinate and implement traffic management directives if needed for area of responsibility; Monitor and balance traffic flows within the area of responsibility in accordance with traffic management directives; Evaluate effectiveness of traffic management directives and make necessary adjustments; Document delay information.

Interfaces

Aeronautical Information Management — (Data Communication) → Integrated Information Workstation - Build 1

AIM sends NOTAMS and other data to the IIW for display.

Aeronautical Information Management ← (NAS Status Data) → System Wide Information Management Build 1B

"AIM exchanges NAS Status data, including equipment status, airspace schedules and status, contingency routings, and RNP-RNAV routings, with other systems via SWIM.

Aeronautical Information Management — (Weather Data) → System Wide Information Management Build 1B

AIM provides PIREPS for distribution to NAS users via SWIM.

BSGS Broadcast Services Ground Station — (Surveillance Data) → System Wide Information Management Build 1B

The GBT provides ADS-B reports to the SDN for distribution to automation systems and other authorized systems and user.

Communications Management System ← (Data Communication) → Communications Management System
Controllers in the same or different facilities communicate via CMS.
Communications Management System ← (Voice Communication) → Communications Management System
Controllers in the same or different facilities communicate via CMS.
Flight Object Management System - Terminal — (Flight Data) → BSGS Broadcast Services Ground Station
FOMS sends flight data to the GBT for broadcast to aircraft.
Flight Object Management System - Terminal ← (Data Communication) → Integrated Information Workstation - Build 1
FOMS sends traffic management decision support tool information to IIW. IIW serves as the controller interface to the tools.
Flight Object Management System - Terminal ← (Flight Data) → Next Generation Traffic Flow Management
FOMS and NG-TFM exchange flight data.
Flight Object Management System - Terminal ← (Flight Data) → Standard Automation Platform Remote Workstation Phase 1
FOMS exchanges flight plan data with the SAP RW.
Flight Object Management System - Terminal — (Flight Data) → Standard Automation Platform Workstation Phase 1
FOMS provides the flight object to the SAP WS for display to the controller.
Next Generation Traffic Flow Management — (NAS Status Data) → Communications Management System
NG-TFM determines the best use of NAS resources and directs CMS to reconfigure communication resources accordingly.
Next Generation Traffic Flow Management — (Data Communication) → Integrated Information Workstation - Build 1
NG-TFM provides traffic flow management data to the IIW for display to controllers.
Next Generation Traffic Flow Management ← (Data Communication) → System Wide Information Management Build 1B
NG-TFM exchanges strategic flow data via SWIM.
Surveillance Data Processor — (Surveillance Data) → BSGS Broadcast Services Ground Station
The SDP provides surveillance data for aircraft that are not responding to beacon interrogations or providing ADS-B reports to the GBT for transmission up both the UAT and 1090 links.
Surveillance Data Processor — (Track Data) → Flight Object Management System - Terminal
SDP sends correlated surveillance data to FOMS for further processing, including association with flight data.
Surveillance Data Processor — (Track Data) → Standard Automation Platform Remote Workstation Phase 1
The SDP provides track data to the SAP RW for display to tower controllers.
Surveillance Data Processor — (Surveillance Data) → Standard Automation Platform Workstation Phase 1
The SDP sends surveillance data to the SAP WS for display to the controller.
System Wide Information Management Build 1B — (Flight Data) → BSGS Broadcast Services Ground Station
FOMS provides the flight object to the GBT for transmission to aircraft via SWIM.
System Wide Information Management Build 1B — (NAS Status Data) → BSGS Broadcast Services Ground Station
"The GBT receives NAS Status Data, including NOTAMS, via SWIM for broadcast to aircraft equipped with UAT communication equipment.
System Wide Information Management Build 1B — (Data Communication) → Communications Management System
Pilots can access data available on SWIM via radios and CMS.
System Wide Information Management Build 1B — (NAS Status Data) → Flight Object Management System - Terminal
FOMS receives NAS status data via SWIM.
System Wide Information Management Build 1B — (Weather Data) → Flight Object Management System - Terminal
FOMS receives weather products from GWP and other sources via SWIM.
System Wide Information Management Build 1B — (Flight Data) → Next Generation Traffic Flow Management
NG-TFM receives flight object data via SWIM.
System Wide Information Management Build 1B — (NAS Status Data) → Next Generation Traffic Flow Management
"NG-TFM receives NAS status data, including airspace changes and oceanic constraints, via SWIM.
System Wide Information Management Build 1B — (Weather Data) → Next Generation Traffic Flow Management
NG-TFM receives weather advisory data via SWIM.
System Wide Information Management Build 1B — (Weather Data) → Standard Automation Platform Workstation Phase 1
The SAP WS receives weather data from SWIM for display to controllers.
System Wide Information Management Build 1B — (Surveillance Data) → Surveillance Data Processor
The SDN distributes surveillance data received from various sensors to NAS automation systems.
Voice Switching and Control System Modification (Technological Refresh) ← (Voice Communication) → Voice Switching and Control System Modification (Technological Refresh)
This interface enables ATC voice communication between controllers in same or different facilities.

Issues

This functionality and associated procedures in separation assurance are needed if the benefits of the improvements to Airspace Management in dynamic resectorization and flexible SUA management are to be achieved. This functionality and associated procedures are also needed to fully exploit the benefits for the enhancements to flight data management.

Service Group Air Traffic Services
Service ATC-Separation Assurance
Capability Aircraft Airspace Capability
Operational Improvement

Current Aircraft To Airspace Separation (102301)

Separation services ensure that aircraft maintain a safe distance from special use airspace (SUA), such as prohibited, restricted, and warning areas. SUA ensures safety for unique aircraft operations or prohibits flight within a specified area. Separation standards ensure that aircraft remain an appropriate minimum distance from the airspace. The standards are applied using such vehicles as regulatory publications and specific control instructions.
01-Jan-2007 to 31-Jul-2008

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

This operational improvement provides separation services to ensure that aircraft maintain a safe distance from special use airspace (SUA), such as prohibited, restricted, and warning areas. The SUA ensures safety for unique aircraft operations by prohibiting other flights within a specified area. Separation standards ensure that aircraft remain an appropriate minimum distance from the airspace. The standards are applied using regulatory publications, specific control instructions, and other methods.

SUA is a designated and charted area depicted on an aeronautical chart as a shaded area. SUA designations include Prohibited , Restricted (R), Warning (W), Military Operations Areas, Controlled, Firing Areas (CFAs), and Alert Areas (A). They are named (i.e., R-4305) and identified by location through charting and geographical coordinates and altitude (floor and ceiling). Some SUAs are activated and then deactivated when not needed for unique operations. Special Use Airspace is designed and procedures are written to ensure safe clearance for all aircraft at all times. SUAs are identified to pilots through Notices to Airmen (NOTAM) and charting and to controllers by designation on radar and chart depictions to assist aircraft in avoiding the SUA. In addition to "fixed" airspace, there are "moving" SUAs or Altitude Reservation Temporary Flight Restrictions (TFR).

TFRs are approved and issued by the FAA to restrict flight activity in the area described in the TFR announcement, issued in the (NOTAM). CFR 14, Part 91, specifies the operations that are prohibited, restricted, or allowed in the TFR area. A TFR applies to a specific hazard or condition with multiple objectives: to provide a safe environment for rescue/relief operations; assist in declared national disasters; protect the President, Vice President, or other public figures; provide a safe environment for space agency operations; and to prevent unsafe congestion of sightseeing or other aircraft above an incident or event. A TFR may also be an area approved by the FAA for use by another requesting Federal agency, such as the Department of the Interior in dealing with forest fires. More recently, TFRs are being established for security purposes and are evolving into Continental U.S. Air Defense Identification Zones.

Benefits

Current operations are provided in the NAS.

Systems

Air Route Surveillance Radar - Model 1E (key system)

The Air Route Surveillance Radar - Model 1E (ARSR-1E) is a 1970s analog radar. It is a long-range radar system with a maximum detection range of 200 nm. The ARSR-1E is a surveillance system used to detect azimuth and slant range of en route aircraft operating between terminal areas. It also provides weather intensity data.

Air Route Surveillance Radar - Model 2 (key system)

The Air Route Surveillance Radar - Model 2 (ARSR-2) is a 1970s analog radar. It is a long-range radar system with a maximum detection range of 200 nm. The ARSR-2 is a surveillance system used to detect azimuth and slant range of en route aircraft operating between terminal areas. It also provides weather intensity data.

Air Route Surveillance Radar - Model 3 (key system)

The Air Route Surveillance Radar - Model 3 (ARSR-3) is a 1980s radar that provides primary long range surveillance data, including slant range and azimuth data. It processes the returns which includes demodulation, analog-to-digital conversion, moving target indicator function, sensitivity time control, range and azimuth gating, and digital target extraction - all of which are performed digitally (with the exception of the demodulation and analog-to-digital conversion). In addition, the ARSR-3 has a weather channel with associated processing to provide weather contour information in digital format.

Air Route Surveillance Radar - Model 4 (key system)

The Air Route Surveillance Radar - Model 4 (ARSR-4) is a three-dimensional, long-range, rotating phased array, primary surveillance radar with integrated height finder capability. It is part of the joint surveillance system (JSS) used in conjunction with ARSR-3 coverage as part of the nationwide air defense command surveillance network. In addition to functions peculiar to the military, the ARSR-4 performs the same basic functions of the ARSR-3, by providing primary long-range surveillance data, including slant range and azimuth data.

Air Traffic Control Beacon Interrogator - Model 4 (key system)

The Air Traffic Control Beacon Interrogator - Model 4 (ATCBI-4) is an air traffic control (ATC) beacon system that interrogates transponder-equipped aircraft. It is a secondary radar system that interrogates transponders, receives aircraft identification, and determines position data.

Air Traffic Control Beacon Interrogator - Model 5 (key system)

The Air Traffic Control Beacon Interrogator - Model 5 (ATCBI-5) is an air traffic control (ATC) beacon system that interrogates transponder-equipped aircraft. It is a secondary radar system that interrogates transponders, receives aircraft identification, and determines position data.

Air Traffic Control Beacon Interrogator - Model 6 (key system)

The Air Traffic Control Beacon Interrogator Model 6 (ATCBI-6) is a ground-based system that interrogates transponders, receives and processes replies from transponders, determines the range and azimuth to the aircraft, and forwards the information to appropriate air traffic control (ATC) automation systems. Replies provide identification and altitude data of the transponder.

Airport Surveillance Radar - Model 11 (key system)

The Airport Surveillance Radar- Model 11 (ASR-11) is a digital, combined primary and secondary surveillance radar (SSR), short-range radar system with a 60 nautical mile (nmi) detection range for medium and small activity airports. The ASR-11 provides advanced digital primary radar including weather intensity surveillance with an integrated monopulse SSR system for use in the airport terminal area. The ASR-11 is used to detect and report the presence and location of an aircraft in a specific volume of airspace. The ASR-11 provides search radar surveillance coverage in controlled airspace primarily in terminal areas.

Airport Surveillance Radar - Model 7 (key system)

The Airport Surveillance Radar - Model 7 (ASR-7) is a short-range (60 nm) analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the Air Traffic Control Beacon Interrogator - Model 4 or Model 5 (ATCBI-4 or ATCBI-5) or Mode S. This system will be replaced by the ASR-11.

Airport Surveillance Radar - Model 8 (key system)

The Airport Surveillance Radar - Model 8 (ASR-8) is a short-range (60 nm), analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the Air Traffic Control Beacon Interrogator - Model 4 or Model 5 (ATCBI-4 or ATCBI-5) or Mode S.

Airport Surveillance Radar - Model 9 (key system)

The Airport Surveillance Radar - Model 9 (ASR-9) is a short range (60 nm) radar system for the airport terminal area. The

ASR-9 processes the returns from aircraft targets, which includes demodulation, analog-to-digital conversion, range and azimuth gating, sensitivity timing control, and a moving target detection function. The moving target detector includes two-level weather contour processing, digital signal processing, correlation and interpolation processing, and surveillance processing. The ASR-9 has a separate weather channel with associated processing capable of providing six-level weather contours. The two-level weather contour processing associated with the moving target detector is only be used for backup. The six-level weather channel is primarily used to supplement Next Generation Weather Radar (NEXRAD) coverage. It is normally used in conjunction with Mode Select (Mode S) but it can accommodate an Air Traffic Control Beacon Interrogator Model 4/5 (ATCBI-4/5).

The ASR-9 will be upgraded/replaced with the ASR-9/Mode S SLEP (see separate mechanism) in the 2007-12 time frame.

Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) (key system)

The Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) (ASR-9/Mode S (SLEP)) mechanism provide the necessary technical refresh to extend the service life of the ASR-9 and Mode S through 2030. The ASTERIX upgrade has not been implemented, but will be implemented at a later date.

Airport Surveillance Radar, Military (key system)

The GPN-20 radar is a military short-range (60 nm) analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the TPX-42 military beacon (interrogate friend or foe, IFF). The GPN-20 is the military version of the FAAs ASR-7/8.

Automated Radar Terminal System - Model IIE (key system)

The Automated Radar Terminal System - Model IIE (ARTS IIE) provides radar data processing (RDP) and decision support tools to the controller in the terminal environment. Utilized at low to medium-size Terminal Radar Control (TRACONs) Facilities the ARTS IIE is capable of receiving input from up to 2 sensors, can process up to 256 tracks simultaneously, and support up to 22 displays. The ARTS IIE implements the Common ARTS software for improved performance maintenance efficiency. The radar data processing (RDP) software provides automated surveillance tracking and display processing. Included in the ARTS IIE software are decision support tools such as Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Mode C intruder alert, Converging Runway Display Aid (CRDA), and Controller Automation Spacing Aid (CASA).

Automated Radar Terminal System - Model IIIA (key system)

The Automated Radar Terminal System - Model IIIA (ARTS IIIA) provides radar data processing (RDP) and decision support tools to the controller in the terminal environment. Utilized at larger airports, ARTS IIIA is capable of receiving input from up to three sensors, can process up to 900 tracks simultaneously and support up to 36 displays. The RDP software provides automated surveillance tracking and display processing. Included in the ARTS IIIA software are decision support tools such as Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Mode C intruder alert, Converging Runway Display Aid (CRDA), Final Monitor Aid (FMA), and controller automation spacing aid.

Automated Radar Terminal System - Model IIIE (key system)

The Automated Radar Terminal System - Model IIIE (ARTS IIIE) consists of the hardware platform and software required providing radar data processing (RDP) and decision support tools to the controller in the terminal environment. The ARTS IIIE is used at consolidated Terminal Radar Approach Control (TRACON) facilities. The Common ARTS program provided an ARTS IIIE capable of receiving input from up to 15 sensors, the ability to process up to 10,000 tracks simultaneously, and support up to 223 displays. The RDP software provides automated surveillance tracking and display processing including mosaic display of radar data. Included in the ARTS IIIE software are decision support tools such as Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Mode C intruder alert, Converging Runway Display Aid (CRDA), Final Monitor Aid (FMA), and controller automation spacing aid.

Automated Radar Terminal System Color Display (key system)

The Automated Radar Terminal System (ARTS) Color Display (ACD) is a high performance, full function, color display that replaces the Full Digital ARTS Display (FDAD) and the Data Entry and Display Subsystem (DEDS). The ACD supports keyboard and trackball functions for the ARTS IIA, ARTS IIE, and ARTS IIIE. A primary and secondary radar data path to the ACD is provided by a radar gateway function incorporated in the event of a failure of either the ARTS IIE and ARTS IIIA processing systems.

Automated Radar Terminal System Software

Provides maintenace of the Automated Radar Terminal System Software (ARTS S/W) for ARTS IIE, ARTS IIIA and ARTS IIIE. Functions include radar data processing (RDP), Minimum Safe Altitude Warning (MSAW); controller automated spacing tool, Converging Runway Display Aid (CRDA), Final Approach Monitor (FMS), and other tools to assist the terminal and tower controllers to manage the air traffic in the terminal area.

Automated Radar Terminal System Software Modification (All Purpose Structured Eurocontrol Information Exchange, etc,)

Automated Radar Terminal System Software Modification (All Purpose Structured Eurocontrol Information Exchange (ASTERIX), etc,), (ARTS S/W Mod (ASTERIX, etc)). Modification to the ARTS software that will add capabilities including weather product integration on the displays, processing of ASTERIX formatted surveillance data, improved traffic management and surveillance data processing, Ground-Initiated Communications Broadcast (GICB), and terminal data link functionality.

Automatic Dependent Surveillance (Capstone) Ground Station

The Automatic Dependent Surveillance (Capstone) Ground Station (ADS (Cap) Ground Station) is a demonstration system used by the Capstone project under Safe Flight 21. It receives Global Positioning System (GPS)-derived aircraft four (4)-dimensional position data, aircraft identification, aircraft velocity, and other selected aircraft data for processing at ATC facilities, and transmits Traffic Information System - Broadcast (TIS-B) information on aircraft in areas of radar coverage (and other airspace status information when available) to properly to equipped aircraft, to support operational trials. These ground stations are located in remote locations in Alaska, and feed the Anchorage Air Route Traffic Control Center (ARTCC) automation system.

Automatic Dependent Surveillance (Safe Flight 21) Ground Station

The Automatic Dependent Surveillance (Safe Flight 21) Ground Station (ADS (SF-21) Ground Station) is a demonstration system used by the Ohio Valley project under the Safe Flight 21 program. It receives Global Positioning System (GPS)-derived aircraft four (4)-dimensional position data, aircraft identification, aircraft velocity, and other selected aircraft data for processing at selected ATC facilities, and transmits Traffic Information System - Broadcast (TIS-B) information on aircraft in areas of radar coverage (and other airspace status information when available) to properly to equipped aircraft, to support SF-21 operational trials. These ground stations will be located in the regions surrounding Memphis, TN and Louisville, KY, and interface with developmental surveillance processing systems.

Automatic Dependent Surveillance - Broadcast (Capstone) Avionics

Automatic Dependent Surveillance - Broadcast (Capstone) Avionics (ADS-B (Cap) Avionics) are the surveillance avionics used by the Capstone project under Safe Flight 21. These are demonstration avionics that are used to support ADS-B-related operational trials in Alaska.

Digital Airport Surveillance Radar (key system)

The Digital Airport Surveillance Radar (DASR) provides advanced digital primary radar including weather intensity surveillance with an integrated mono-pulse Secondary Surveillance Radar (SSR) system for use in the airport terminal area. (Military version of ASR-11)

Digital Bright Radar Indicator Tower Equipment

The Digital Bright Radar Indicator Tower Equipment (DBRITE) is a tower display system that provides a raster scan presentation of radar/beacon videos and automation system alphanumeric data. The system accepts radar, beacon, external map, analog data, and automation system data.

Digital Voice Recorder System (key system)

Provides modern digital voice recording devices used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

In Feburary 2004, the DVRS was upgraded with a 24-channel card, which replaced the 16-channel card. This minor upgrade, called DVR II, was not extended to the systems installed prior to February 2004.

Digital Voice Recorder System Replacement

The Digital Voice Recorder System Replacement (DVRS Replacement) is a modern digital system used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

Direct Access Radar Channel

The Direct Access Radar Channel (DARC) provides a back-up processing path to provide surveillance data to the displays in the event of a primary channel (Host Computer System (HCS) failure. The DARC path is a physically, logically and electrically separate processing path (with diverse hardware and software) from the primary Host Computer System (HCS) Radar Data Processing (RDP) paths. Thus DARC provides a tertiary path, to keep radar data on the controller''s displays, should both HCS RDP paths be disabled for any reason. The DARC provides radar data processing, very limited flight data processing, but with significantly less functionality than the HCS. Basically, DARC serves as a lifeboat should both HCS processing paths become disabled.

Display System Replacement (key system)

The Display System Replacement (DSR) provides continuous real-time, automated support to air traffic controllers for the display of surveillance, flight data and other critical control information. This information is processed by the Host and Oceanic Computer System Replacement (HOCSR) and the Enhanced Direct Access Radar Channel (EDARC) subsystems. The DSR provides controller workstations, displays, and input/output devices and a communications infrastructure to connect the DSR with external processing elements of the en route ATC automation system.

Emergency Voice Communications System (key system)

The Emergency Voice Communications System (EVCS) is located at Headquarters (HQ), Regional Offices, several Air Route Traffic Control Centers (ARTCCs), Terminal Radar Approach Control (TRACON) facilities, and other selected sites. EVCS uses two (2) dedicated Federal Telecommunications Service 2001 (FTS2001) dial access channels at most FAA locations. Dedicated dial lines using the Public Switched Telephone Network (PSTN) are used at locations not having direct access to FTS2001. Supports HQ and Regional Communications Command Centers'' functions for accident and incident reports, hijacks, aircraft crashes, aviation security matters, military activities, natural disasters, etc.

En Route Communications Gateway

The En Route Communications Gateway (ECG) replaces PAMRI and provides a modernized LAN-based infrastructure capable of accommodating ERAM with minimal modifications. The PAMRI functions to be replaces include providing communications interfaces to external systems located in other ARTCCs, TRACONs, AFSSs, ATCSCC, NORAD, US Law Enforcement, US Customs, Military Base Operations, and international ACCs. Other interfaces include the FDIO Central Control Unit, which exchanges FDIO data with FAA and DOD facilities, and the NADIN Concentrator, which exchanges data through the NADIN PSN with the the M1FC via WMSCR. ECG increases the number of external interfaces to radars from 24 to 36. ECG provides internal interfaces between HCS and DARC (or EBUS) and between HCS and traffic flow processors such as ETMS and DSP. ECG includes a Monitor and Control subsystem and a display for monitoring up to two dozen radars--called the Random Access Plan Position Indicator (RAPPI).

The operational components of ECG consist of a front end processor (communications and surveillance interfaces), two gateway processors (internal connectivity to HCS and DARC/EBUS), and separate LANs that communicate between the front end and gateway processors on the primary channel and between the front end and gateway processors on the backup channel. The primary data path, consisting of the ECG primary gateway and the HCS, operate on separate hardware platforms. However, the backup data path, consisting of the ECG backup gateway and the EBUS, will operate on the same hardware platform--the ECG gateway platform. This processor, with both functions performed therein, is renamed to the Backup Interface Processor (BIP). In essence, a single processor operates on the backup channel, supporting both the ECG gateway function and the EBUS function. These two functions will remain, however, as two mechanisms in the NAS architecture.

Enhanced Back-up Surveillance

The Enhanced Back-Up Surveillance (EBUS) system replaces the DARC system in use at the 20 Air Route Traffic Control Centers (ARTCC) in the contiguous United States (CONUS), the William J. Hughes Technical Center (WJHTC), and the FAA Academy (FAAAC). The EBUS design employs the existing FAA-certified software of the Microprocessor En Route Automated Radar Tracking System (Micro-EARTS) application to provide radar data processing (RDP) services for the replacement legacy backup system. Micro-EARTS provides key capabilities not supported by the DARC legacy system it replaces, among which are the safety functions of Conflict Alert (CA), Mode-C Intruder (MCI), and Minimum Safe Altitude Warning (MSAW). EBUS also provides Next Generation Radar (NEXRAD) weather data to R-position users via the DSR

Backup Communications Network (BCN). EBUS makes the R-position functionality on the backup channel more comparable to that of the primary channel.

The EBUS software (Micro EARTS) and the ECG backup gateway software will share the same hardware platform such that both software functions will reside in the same ECG backup gateway hardware platform.

Enhanced Terminal Voice Switch (key system)

The Enhanced Terminal Voice Switches (ETVS) are installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) facilities with more than four air traffic controller positions. The ETVS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The ETVS (installed in the ATCT) provides the ATC operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the ETVS.

The ETVS (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within a TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the ETVS.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate ETVS systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Fixed Position Surveillance - Model 117

The Fixed Position Surveillance - Model 117 (FPS-117) radar is a joint-use military surveillance system used by the FAA to detect slant range and azimuth of en route aircraft. These radars are located in Alaska (12) and Hawaii (1), and are expected to be sustained until at least 2020.

Fixed Position Surveillance Model 20 Series

The Fixed Position Surveillance Model 20 Series (FPS-20 Series) is a military primary radar of various models (FPS-20A, FPS-64, FPS-66A, FPS-67/A/B, and ARSR-60M) used by the FAA to detect slant range and azimuth of en route aircraft operating between terminals in the continental United States. Each of the different radar models is a similar variation of the original FPS-20 military radar.

Full Digital Automated Radar Terminal System Display (key system)

Full Digital ARTS Display (FDAD) is the fully digital ARTS display system that provides the display and data input devices for terminal controllers using ARTS IIIE and ARTS IIIA. The FDAD can work in analog video time share mode or full digital mode. The present application is analog video time share mode.

Heating, Ventilation and Air Conditioning - Long-Range Radar (key system)

The Heating, Ventilation and Air Conditioning - Long-Range Radar (HVAC - LRR) mechanism provides the systems to maintain the temperature and relative humidity within the facility at acceptable levels for LRR system operation or personnel comfort as required. This includes filtering of air to Occupational Safety and Health Administration (OSHA) requirements.

High Frequency Airborne Radios

High Frequency (HF) Airborne Radios are analog (HF multi-channel radio transceivers operating in the 2 - 30 Mhz frequency band installed in airborne commercial, cargo, and military aircraft transiting the oceanic, en route, terminal, or flight service station airspace domains. These transceivers are typically used in transoceanic applications.

High Frequency Ground Radios

High Frequency (HF) Ground Radios are analog HF radio devices operating in the 2 - 30 Mhz frequency band, which may be single channel transmitters and receivers or multi-channel transceivers. These radio devices are installed at oceanic and en route facilities and used to support tactical air traffic control (ATC) voice communications between a ground controller and a pilot in an aircraft in the oceanic domain. Additionally, these devices are also installed at regional facilities and used to support voice command and control communications /coordination in emergency or during disaster recovery situations occurring in the NAS.

Host Computer System (key system)

The Host Computer System (HCS) receives and processes surveillance reports, and flight plan information. The HCS sends search/beacon target, track and flight data, surveillance and alphanumeric weather information, time data, traffic management advisories and lists to the (Display System Replacement) DSR. The HCS associates surveillance-derived tracking information with flight-planning information. The DSR sends requests for flight data, flight data updates, and track control messages to the HCS. HCS-generated display orders are translated for use within the DSR workstation. While radar data processing is distributed among the terminal and En Route computer resources, the HCS performs virtually all of the flight data processing for its entire geographical area of responsibility. Every tower (ATCT) and terminal radar approach control (TRACON) relies exclusively on its parent HCS for flight data.

The HCS also runs algorithms that perform aircraft to aircraft (conflict alert) and aircraft to terrain (Minimum Safe Altitude Warning) separation assurance. The HCS algorithms provide visual and audible alerting to the controller when conflicts are identified.

The HCS presently supplies real time surveillance, flight data and other information to several decision support tools housed in collocated outboard processors connected via two-way high bandwidth links to the HCS and DSR. These are the (User Request Evaluation Tool, (URET), and the Traffic Management Advisory (TMA. URET performs probing of tentative flight plan changes to determine their viability. TMA provides sequencing and spacing information to align the aircraft in En Route airspace for approach.

Integrated Communications Switching System Type I (key system)

The Integrated Communications Switching System Type I (ICSS I) are installed at Airport Traffic Control Towers (ATCT), Terminal Radar Approach Control (TRACON) facilities, and Automated Flight Service Stations (AFSS).

The ICSS I (installed in the ATCT) provides the air traffic control (ATC) operational ground-ground voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/air traffic control system command center (ATCSCC) specialists. Ground-air radio connectivity between ATCT controllers and pilots is also supported by the ICSS I.

The ICSS I (installed in the TRACON) provides the ATC operational ground-ground voice communications interconnectivity between controllers within TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Ground-air radio connectivity between TRACON controllers and pilots is also supported by the ICSS I.

The ICSS I (installed in the AFSS) provides the ATC operational ground-ground voice communications interconnectivity between specialists within an AFSS (intercom), interconnectivity between specialists in separate AFSSs (interphone), and interconnectivity between Flight Service Station (FSS) specialists and Air Route Traffic Control Center (ARTCC) controllers/TRACON controllers/ATCT controllers/Air Traffic Control System Command Center (ATCSCC) specialists. Ground-air radio connectivity between AFSS specialists and pilots is also supported by the ICSS I.

Integrated Communications Switching System Type II (key system)

The Integrated Communications Switching System Type II (ICSS II) are installed at Airport Traffic Control Towers (ATCT), Automated Flight Service Stations(AFSS), and Terminal Radar Approach Control (TRACON) facilities.

The ICSS II (installed in the ATCT) provides the air traffic control (ATC) operational ground-ground voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Ground-air radio connectivity between ATCT controllers and pilots is also supported by the ICSS II.

The ICSS II (installed in the TRACON) provides the ATC operational ground-ground voice communications interconnectivity between controllers within TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC)) controllers/ Flight Service Station (FSS) specialists/air traffic control system command center (ATCSCC) specialists. Ground-air radio connectivity between TRACON controllers and pilots is also supported by the ICSS II.

Integrated Communications Switching System Type III (key system)

The Integrated Communications Switching System Type III (ICSS III) is installed at Automated Flight Service Stations (AFSS). The ICSS III (installed in the AFSS) provides the air traffic control (ATC) operational ground-to-ground (G/G)voice communications interconnectivity between specialists within an AFSS (intercom), interconnectivity between specialists in separate AFSSs (interphone), and interconnectivity between Flight Service Station (FSS) specialists and Air Route Traffic Control Center (ARTCC) controllers/Terminal Radar Approach Control (TRACON) controllers/ATCT controllers/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between AFSS specialists and pilots is also supported by the ICSS III.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS II systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Leased Inter-facility National Airspace System Communication System

The Leased Inter-facility National Airspace System Communication System (LINCS) provides transmission channels of various industry-standard types between any specified end points, used to satisfy all FAA operational and some administrative telecommunication requirements.

Low-Density Radio Communications Link (key system)

The Low-Density Radio Communications Link (LDRCL) is an FAA owned Low-Density Radio Communications Link (LDRCL) satisfies short-haul, low-density communication requirements. It provides user access (via tail circuits) to a Radio Communications Link (RCL) site or connectivity between two operational facilities

Microprocessor-En Route Automated Radar Tracking System (key system)

The Microprocessor-En Route Automated Radar Tracking System (Micro-EARTS) is a radar processing system implemented with Commercial Off-the-Shelf (COTS) equipment, for use in both En Route and Terminal environments. It provides single sensor and a mosaic display of traffic and weather using long- and short-range radars. At Anchorage, Alaska, Micro-EARTS also provides Automatic Dependent Surveillance-Broadcast (ADS-B) surveillance and display. Micro-EARTS interfaces with multiple types of displays, including Display System Replacement (DSR), Digital Bright Radar Indicator Tower Equipment (DBRITE), and the flat panel tower controller displays.

Military Airspace Management System (key system)

The Military Airspace Management System (MAMS) is an automated system that schedules and documents Special Use Airspace (SUA) and other related airspace utilization within the DOD. It receives airspace schedule messages (ASM) from local DOD airspace scheduling agencies. The MAMS Central Facility, located at Tinker Air Force Base, Oklahoma, transmits ASMs and utilization data to the FAA Special Use Airspace Management System (SAMS) Central Facility, located at the ATCSCC. The MAMS receives airspace response messages from the SAMS.

Multi-Mode Digital Radios (key system)

Multi-Mode Digital Radios (MDRs) are ground-based Very High Frequency (VHF) air-traffic-control radios that can operate in several configurations: 1) analog voice with 25kHz channel spacing; 2) analog voice with 8.33 kHz channel spacing; and 3) VHF Data Link (VDL) Mode-3 which consists of two-way digital voice and data communication.

Peripheral Adapter Module Replacement Item (key system)

The Peripheral Adapter Module Replacement Item (PAMRI) is an interface peripheral to the HOCSR. It provides a conduit through which the HOCSR receives and exchanges data, primarily radar data, flight data and interfacility data. The PAMRI converts communication protocols and translates data formats so the Host and EDARC can communicate with external devices.

Power System - Long-Range Radar (key system)

The Power System - Long-Range Radar (Pwr Sys - LRR) mechanism provides conditioning of commercial power, including uninterruptible power systems (UPS), to eliminate voltage dropouts, surges, and voltage sags caused by sources outside the facility. Power distribution, grounding, bonding and shielding of electrical system within the facility is also part of the Pwr Sys - LRR.

Radar Automated Display System (key system)

The Radar Automated Display System (RADS) is the Air Traffic Controller workstation for the Automated Radar Terminal System Model IIE (ARTS IIE).

Radio Communication Link

Radio Communication Link (RCL) is an integrated voice and data microwave transmission system designed to provide the FAA with cost effective and reliable service for its high capacity NAS communications routes. RCL interconnects air route traffic control center (ARTCC) facilities with long range radar installations and other air traffic control (ATC) facilities.

Radio Control Equipment (key system)

Radio Control Equipment (RCE), located at both ATC facilities and remote communication sites, control the operation of remotely located ground to air Very High Frequency/Ultra High Frequency (VHF/UHF) radios used by air traffic controllers to communicate with pilots. RCE interfaces with the voice switch at the ATC facility, telephone landlines, and ground to air radios at the En Route Remote Communications Air/Ground (RCAG) sites, Terminal Remote Transmitter/Receiver (RTR) sites, and Flight Service Station Remote Communications Outlet (RCO) sites.

Rapid Deployment Voice Switch Type I (key system)

The Rapid Deployment Voice Switch Type I (RDVS I) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS I (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the RDVS I. The RDVS I (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the RDVS I.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS I systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Rapid Deployment Voice Switch Type II (key system)

The Rapid Deployment Voice Switch Type II (RDVS II) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS II (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the RDVS II. The RDVS II (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the RDVS II.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS II systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Rapid Deployment Voice Switch Type IIA (key system)

The Rapid Deployment Voice Switch Type IIA (RDVS IIA) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS IIA (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. The RDVS IIA also supports air-to-ground (A/G) radio connectivity between ATCT controllers and pilots. The RDVS IIA (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between TRACON controllers and pilots is also supported by the RDVS IIA.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS IIA systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Remote Automated Radar Terminal System (ARTS) Color Display (key system)

Remote Automated Radar Terminal System Color Display (R-ACD) Description The Remote - Automated Radar Terminal System (ARTS) Color Display (ACD) is a high performance, full function, and color display providing air traffic controllers with the functionality of the Digital Bright Radar Indicator Tower Equipment (DBRITE). This display supports keyboard and trackball functions for the ARTS II, ARTS IIE, and ARTS IIIE. A radar gateway function will be incorporated to provide a primary and secondary radar data path to the R-ACD in the event of failure of both the ARTS II and ARTS IIIA processing systems.

Satellite Communication Airborne Radios

The Satellite Communication (SATCOM) airborne radios are transceivers installed in commercial, cargo, and military aircraft transiting in the National Airspace System (NAS) and are used as an alternate means of voice communications between pilots in aircraft and ground controllers. These transceivers are typically used in transoceanic applications.

Satellite Communication Ground Radios

Satellite Communications (SATCOM) Ground Radios are transceivers installed at oceanic and en route facilities to support an alternative means of tactical air traffic control (ATC) voice communications between ground controllers and pilots in aircraft. These transceivers are typically used in transoceanic applications. These transceivers are also installed at regional facilities and used as an alternate means of communications in case of total ground communications failure or between locations in mountainous terrain or where other means of communications are not possible (e.g., Alaska).

Oceanic air to ground satellite communications are provided via a communications service provider. The FAA currently has no plans to develop or implement its own air to ground SATCOM ground radios.

Small Tower Voice Switch (key system)

The Small Tower Voice Switch (STVS) is installed in small Airport Traffic Control Towers (ATCT) and in Flight Service Stations (FSS). The basic STVS has four operator positions. The STVS provides the Air Traffic Control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and Air Route Traffic Control Center (ARTCC) controllers/ Terminal Radar Approach Control (TRACON) controllers/FSS specialists/air traffic control system command center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the STVS. The STVS (installed in the FSS) provides the ATC operational G/G voice communications interconnectivity between specialists within an FSS (intercom), interconnectivity between specialists in separate FSSs (interphone), and interconnectivity between FSS specialists and Air Route Traffic Control Center (ARTCC) controllers/Terminal Radar Approach Control (TRACON) controllers/ATCT controllers/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground radio connectivity between FSS specialists and pilots is also supported by the STVS.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate STVS systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Special Use Airspace Management System (key system)

The Special Use Airspace Management System (SAMS) is an automated system that supports integrated Special Use Airspace (SUA) schedule operations within the FAA and between the FAA and the DOD. The SAMS consists of the SAMS Central Facility (i.e., the SAMS Processor), located at the ATCSCC, and SAMS Workstations located at the ATCSCC, ARTCCs, Towers, TRACONs, and CERAPs. The SAMS Processor receives airspace schedule messages from the Military Airspace Management System (MAMS) Central Facility and transmits them to the SAMS Workstations. The SAMS Processor transmits airspace response messages to the MAMS.

Standard Terminal Automation Replacement System Early Display Configuration

The Standard Terminal Automation Replacement System, Early Display Configuration (STARS EDC) provides STARS workstations at a limited number of ARTS IIIA facilities to replace aging DEDS and provide validation of the STARS workstation design before the complete STARS is implemented. STARS EDC will include updates to ARTS software for life cycle maintenance, additional human-machine interface (HMI) requirements for both tower and Terminal Radar Approach Control (TRACON), and Automated Radar Terminal System Model IIIE (ARTS IIIE) human factors validation.

Standard Terminal Automation Replacement System Tower Display Workstation

The Standard Terminal Automation Replacement System Tower Display Workstation (STARS TDW) provides the interface between the ATC Towerl (ATCT) controller and the STARS processing unit.

Surveillance Processor (Safe Flight 21)

The Surveillance Processor (Safe Flight 21) is a demonstration system that receives, processes, and distributes surveillance data between Safe Flight 21 (SF-21) architectural elements to support operational trials. The processor receives surveillance data from various sources, including surveillance sensors, Automatic Dependent Surveillance-Broadcast (ADS-B) systems, multilateration systems, Air Traffic Control (ATC) automation systems, and flight plan processing systems. The processor fuses the various surveillance data to create aircraft track data, which is distributed to various SF-21 architectural elements. One of the capabilities supported by the processor is the processing and distribution of Traffic Information Services - Broadcast (TIS-B) information to ADS (SF-21) Ground Stations, for subsequent transmission to aircraft.

Ultra High Frequency Airborne Radios (key system)

The Ultra High Frequency Avionics (UHF Avionics) are analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225-400 MHz frequency band, which are multi-channel transceivers, installed in an airborne military platform. These airborne devices support the tactical two-way voice communications/ coordination between the military pilot in the military aircraft and the controller on the ground.

Ultra High Frequency Ground Radios (key system)

Ultra High Frequency (UHF) Ground Radios are analog UHF amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 Mhz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and flight service station domains.

Ultra High Frequency Ground Radios - Replacement (key system)

The Ultra High Frequency Ground Radios - Replacement (UHF Ground Radios - Repl) mechanism represents analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 MHz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and Flight Service Station domains.

Very High Frequency Airborne Radios (key system)

Very High Frequency (VHF) Airborne Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 Mhz frequency band which are multi-channel transceivers installed in an airborne platform (e.g., commercial, cargo, and general aviation aircraft). These airborne devices support the tactical two-way voice communications/coordination between the pilot in the aircraft and the controller on the ground.

Very High Frequency Ground Radios (key system)

Very High Frequency (VHF) Ground Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 MHz frequency band which are single-channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the pilot in commercial, cargo, or general aviation aircraft in the oceanic, en route (i.e., ARTCC), terminal (i.e., TRACON/tower), and flight service station domains. Additionally, there are analog VHF frequency modulation (VHF - FM) radio devices operating in the 161 - 174 MHz frequency band that are multi-channel transceivers. These transceivers are used by flight inspection, aviation security, and airway facility specialists supporting local airport operations and maintenance or to perform their operational maintenance mission in support of the NAS. However, these same VHF-FM transceivers are also used to support the resolution of emergency situations or establish a level of voice command and control communications/coordination during disaster recovery.

Very High Frequency Multi-Mode Airborne Radios (key system)

Very High Frequency Multi-Mode Airborne Radios (VHF MM Airborne Radios) refers to an airborne radio operating in the very high frequency (VHF) range capable of operating in the following modes: (1)) analog voice (i.e., 25 kHz spacing for use in the United States and other similarly equipped countries); (2) VHF Digital Link Mode 2 (VDL Mode-2) (two-way digital data transmission); (3) VHF Digital Link Mode 3 (VDL Mode-3), (integrated two-way digital voice/data transmission); and (4) analog voice (i.e., 8.33 kHz spacing for use in Europe and other similarly equipped countries).

Voice Switching and Control System (key system)

The Voice Switching and Control System (VSCS) is installed in the Air Route Traffic Control Center (ARTCC). The VSCS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The VSCS provides the Air Traffic Control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ARTCC (intercom), interconnectivity between controllers in separate ARTCCs (interphone), and interconnectivity between ARTCC controllers and Terminal Radar Approach Control (TRACON) controllers/Airport Traffic Control Tower (ATCT) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ARTCC controllers and pilots is also supported by the VSCS.

Voice Switching and Control System Modification (Technological Refresh) (key system)

The Tech Refresh for VSCS is a service life extension. The Tech Refresh encompasses workstation upgrade, video display monitor, control equipment power, VSCU supportability, control shelf power supply, and software development demonstration system expansion.

Voice Switching and Control System Training and Backup Switches

Voice Switching and Control System Training and Backup Switch (VTABS) was developed to meet AT requirements for a separate standalone VSCS Backup and Training System. VTABS can be configured as a 50-position switch with the capability to support air traffic operations in the event of VSCS failure, hardware and software maintenance or power loss.

Western Electric Company Model 301 Voice Switch

The Western Electric Company Model 301 Voice Switch (WECO 301) supports air-to-ground communications between air traffic controllers and pilots and ground-to-ground communications among air traffic control (ATC) personnel.

People

Flight Service Specialist

A Flight Service Specialist performs the following activities:

* Provide services to aircraft in flight and during the pre-flight phase,

* Monitoring and restoration of NAVAID; Issuing local airport advisories,

* Relaying ATC clearances, advisories or requests,

* Issuing military flight advisory messages,

* Receiving and issuing NOTAMS,

* Assisting is search and rescue communication searches,

* Activating and closing flight plans,

* Making unscheduled broadcasts,

* Soliciting and issuing PIREPS,

* Presenting pilot weather briefings to airborne aircraft,

* Locating lost aircraft,

* Recording aircraft contacts,

* Providing weather advisories and flight plan services,

* Providing hazardous area reporting services, and

* Keeping airmen and weather information current.

Non-Radar Controller

A Non-Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate transfer of control, communications, and flight data; Ensure computer entries are completed on instructions or clearances issued or received; Ensure strip marking is completed on instructions or clearances issued or received.

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Planning Controller

A Planning Controller performs the following activities: Ensure separation; Initiate control instructions; Operate interphones; Conduct air/ground communications via data link; Coordinate tactical traffic flows; Scan flight data; Correlate with situation data; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the tactical controller when aware of those instructions.

Radar Controller

A Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate automated handoffs; Assist the radar associate controller with non-automated handoff actions when needed; Assist the radar associate controller in coordination when needed; Scan radar display; Correlate with flight progress strip information; Ensure computer entries are completed on instructions or clearances you issue or receive; Ensure strip marking is completed on instructions or clearances you issue or receive.

Traffic Management Coordinators

Traffic Management Coordinators track and predict traffic flows, analyze ground delays, evaluate alternative routing strategies, and plan local traffic patterns at the local facility (ARTCC, TRACON, or Towers)

Traffic Management Specialist

Traffic Management Specialists perform the following activities: Balance air traffic demand with the airspace's capacity to maintain maximum and efficient utilization of the NAS; Coordinate and implement traffic management directives if needed for area of responsibility; Monitor and balance traffic flows within the area of responsibility in accordance with traffic management directives; Evaluate effectiveness of traffic management directives and make necessary adjustments; Document delay information.

Interfaces

Air Route Surveillance Radar - Model 1E — (Surveillance Data) ➔ Air Traffic Control Beacon Interrogator - Model 6

The ATCBI-6 correlates return signals from the primary radar with beacon signals and transmits the data to the automation system.

Air Route Surveillance Radar - Model 1E — (Surveillance Data) ➔ Peripheral Adapter Module Replacement Item

The ARSR-1 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the PAMRI interface, which then routes the data to the HCS and DARC for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 1E — (Weather Data) ➔ Peripheral Adapter Module Replacement Item

The ARSR-1E long-range radar provides detected weather data to the PAMRI for processing at en route facilities.

Air Route Surveillance Radar - Model 2 — (Surveillance Data) ➔ Air Traffic Control Beacon Interrogator - Model 6

The ATCBI-6 correlates return signals from the primary radar with beacon signals and transmits the data to the automation system.

Air Route Surveillance Radar - Model 2 — (Surveillance Data) ➔ Peripheral Adapter Module Replacement Item

The ARSR-2 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the PAMRI interface, which then routes the data to the HCS and DARC for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 2 — (Weather Data) ➔ Peripheral Adapter Module Replacement Item

The ARSR-2 long-range radar provides detected weather data to the PAMRI for processing at en route facilities.

Air Route Surveillance Radar - Model 3 — (Surveillance Data) ➔ Air Traffic Control Beacon Interrogator - Model 6

The ATCBI-6 correlates return signals from the primary radar with the beacon signals and transmits the data to the automation system for tracking and display.

Air Route Surveillance Radar - Model 3 — (Surveillance Data) ➔ Microprocessor-En Route Automated Radar Tracking System

The ARSR-3 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the Micro-EARTS for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 3 — (Surveillance Data) ➔ Peripheral Adapter Module Replacement Item

The ARSR-3 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the PAMRI interface, which then routes the data to the HCS and DARC for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 3 — (Weather Data) ➔ Peripheral Adapter Module Replacement Item

The ARSR-3 long-range radar provides detected weather data to the PAMRI for processing at en route facilities.

Air Route Surveillance Radar - Model 4 — (Surveillance Data) ➔ Air Traffic Control Beacon Interrogator - Model 6

The ATCBI-6 correlates return signals from the primary radar with the beacon signals and transmits the data to the automation system for tracking and display.

Air Route Surveillance Radar - Model 4 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIE
The ARSR-4 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.
Air Route Surveillance Radar - Model 4 — (Weather Data) ➔ Automated Radar Terminal System - Model IIE
The ARSR-4 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIE for processing and use in controlling air traffic in the CERAP domain (Guam).
Air Route Surveillance Radar - Model 4 — (Surveillance Data) ➔ Microprocessor-En Route Automated Radar Tracking System
The ARSR-4 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the Micro-EARTS for processing and use in controlling air traffic in the en route domain.
Air Route Surveillance Radar - Model 4 — (Weather Data) ➔ Microprocessor-En Route Automated Radar Tracking System
The ARSR-4 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the Micro-EARTS for processing and use in controlling air traffic in the en route domain.
Air Route Surveillance Radar - Model 4 — (Surveillance Data) ➔ Peripheral Adapter Module Replacement Item
The ARSR-4 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the PAMRI interface, which then routes the data to the HCS and DARC for processing and use in controlling air traffic in the en route domain.
Air Route Surveillance Radar - Model 4 — (Weather Data) ➔ Peripheral Adapter Module Replacement Item
The ARSR-4 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the PAMRI for processing and use in controlling air traffic in the en route domain.
Air Traffic Control Beacon Interrogator - Model 4 — (Surveillance Data) ➔ Air Route Surveillance Radar - Model 1E
The ARSR-1 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports via a CD-2, which sends the data to an automation system for tracking and display.
Air Traffic Control Beacon Interrogator - Model 4 — (Surveillance Data) ➔ Air Route Surveillance Radar - Model 2
The ARSR-2 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports via a CD-2, which sends the data to an automation system for tracking and display.
Air Traffic Control Beacon Interrogator - Model 4 — (Surveillance Data) ➔ Airport Surveillance Radar - Model 9
The ASR-9 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports and then sends the data to an automation system for tracking and display.
Air Traffic Control Beacon Interrogator - Model 4 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIE
The ATCBI-4 sends aircraft identification, position, and altitude to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.
Air Traffic Control Beacon Interrogator - Model 4 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIE
The ATCBI-4 sends aircraft identification, position, and altitude to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.
Air Traffic Control Beacon Interrogator - Model 4 — (Surveillance Data) ➔ Microprocessor-En Route Automated Radar Tracking System
The ATCBI-4 sends aircraft identification, position, and altitude to the Micro-EARTS for processing and use in controlling air traffic in the terminal domain from a CERAP.
Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) ➔ Air Route Surveillance Radar - Model 1E
The ARSR-1 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports via a CD-2, which sends the data to an automation system for tracking and display.
Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) ➔ Air Route Surveillance Radar - Model 2
The ARSR-2 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports via a CD-2, which sends the data to an automation system for tracking and display.
Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) ➔ Air Route Surveillance Radar - Model 3
The ARSR-3 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports and then sends the data to an automation system for tracking and display.
Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) ➔ Air Route Surveillance Radar - Model 4
The ARSR-4 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports and then sends the data to an automation system for tracking and display.
Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) ➔ Airport Surveillance Radar - Model 9
The ASR-9 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports and then sends the data to an automation system for tracking and display.
Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIE
The ATCBI-5 sends aircraft identification, position, and altitude to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.
Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIA
The ATCBI-5 sends aircraft identification, position, and altitude to the ARTS IIIA for processing and use in controlling air traffic in the terminal domain.
Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIE
The ATCBI-5 sends aircraft identification, position, and altitude to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.
Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) ➔ Microprocessor-En Route Automated Radar Tracking System
The ATCBI-4 sends aircraft identification, position, and altitude to the Micro-EARTS for processing and use in controlling air traffic in the en route domain, as well as in terminal domains associated with CERAPs.
Air Traffic Control Beacon Interrogator - Model 6 — (Surveillance Data) ➔ Peripheral Adapter Module Replacement Item
The ATCBI-6 sends aircraft identification, position, and altitude to the PAMRI, which then routes to the HCS or DARC for processing and use in controlling air traffic in the en route domain.
Airport Surveillance Radar - Model 11 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIE
The ASR-11 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 11 — (Weather Data) ➔ Automated Radar Terminal System - Model IIE
The ASR terminal radar provides detected weather data to the ARTS for processing.
Airport Surveillance Radar - Model 11 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIE

The ASR-11 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 11 — (Weather Data) → Automated Radar Terminal System - Model IIIE

The ASR primary radar provides detected weather data to the ARTS for processing.

Airport Surveillance Radar - Model 11 — (Surveillance Data) → Microprocessor-En Route Automated Radar Tracking System

The ASR-11 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the automation equipment interface, which then routes the data to the Micro EARTS for processing and use in controlling air traffic in the en route domain.

Airport Surveillance Radar - Model 7 — (Surveillance Data) → Automated Radar Terminal System - Model IIE

The ASR-7 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 7 — (Weather Data) → Automated Radar Terminal System - Model IIE

The ASR-7 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 7 — (Surveillance Data) → Automated Radar Terminal System - Model IIIE

The ASR-7 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 7 — (Weather Data) → Automated Radar Terminal System - Model IIIE

The ASR-7 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 7 — (Surveillance Data) → Microprocessor-En Route Automated Radar Tracking System

The ASR-7 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the Micro-EARTS for processing and use in controlling air traffic in the terminal domain from a CERAP.

Airport Surveillance Radar - Model 8 — (Surveillance Data) → Automated Radar Terminal System - Model IIE

The ASR-8 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 8 — (Weather Data) → Automated Radar Terminal System - Model IIE

The ASR-8 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIE use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 8 — (Surveillance Data) → Automated Radar Terminal System - Model IIIA

The ASR-8 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIA for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 8 — (Weather Data) → Automated Radar Terminal System - Model IIIA

The ASR-8 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIIA for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 8 — (Surveillance Data) → Automated Radar Terminal System - Model IIIE

The ASR-8 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 8 — (Weather Data) → Automated Radar Terminal System - Model IIIE

The ASR-8 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 8 — (Surveillance Data) → Microprocessor-En Route Automated Radar Tracking System

The ASR-8 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the Micro-EARTS for processing and use in controlling air traffic in the terminal domain from a CERAP.

Airport Surveillance Radar - Model 8 — (Surveillance Data) → Peripheral Adapter Module Replacement Item

The ASR-8 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the PAMRI for processing and use in controlling air traffic in the terminal domain from an ARTCC (for terminals with no TRACON).

Airport Surveillance Radar - Model 9 — (Surveillance Data) → Automated Radar Terminal System - Model IIE

The ASR-9 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 9 — (Weather Data) → Automated Radar Terminal System - Model IIE

The ASR terminal radar provides detected weather data to the ARTS for processing.

Airport Surveillance Radar - Model 9 — (Surveillance Data) → Automated Radar Terminal System - Model IIIA

The ASR-9 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIA for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 9 — (Weather Data) → Automated Radar Terminal System - Model IIIA

The ASR terminal radar provides detected weather data to the ARTS for processing.

Airport Surveillance Radar - Model 9 — (Surveillance Data) → Automated Radar Terminal System - Model IIIE

The ASR-9 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 9 — (Weather Data) → Automated Radar Terminal System - Model IIIE

The ASR primary radar provides detected weather data to the ARTS for processing.

Airport Surveillance Radar, Military — (Surveillance Data) → Automated Radar Terminal System - Model IIE

The GPN-20 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar, Military — (Weather Data) → Automated Radar Terminal System - Model IIE

The GPN-20 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIE use in controlling air traffic in the terminal domain.

Airport Surveillance Radar, Military — (Surveillance Data) → Automated Radar Terminal System - Model IIIA

The GPN-20 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIA for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar, Military — (Weather Data) → Automated Radar Terminal System - Model IIIA

The GPN-20 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIIA use in controlling air traffic in the terminal domain.

Airport Surveillance Radar, Military — (Surveillance Data) → Automated Radar Terminal System - Model IIIE
The GPN-20 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar, Military — (Weather Data) → Automated Radar Terminal System - Model IIIE
The GPN-20 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIIE use in controlling air traffic in the terminal domain.
Airport Surveillance Radar, Military — (Surveillance Data) → Peripheral Adapter Module Replacement Item
The GPN-20 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the PAMRI for processing and use in controlling air traffic in the terminal domain from an ARTCC (for terminals with no TRACON).
Automated Radar Terminal System - Model IIE — (Flight Data) → Automated Radar Terminal System Color Display
The ACD displays ARTS flight data to the controller.
Automated Radar Terminal System - Model IIE — (Track Data) → Automated Radar Terminal System Color Display
The ARTS sends track data to the ACD for controller use.
Automated Radar Terminal System - Model IIE ← (Track Data) → Peripheral Adapter Module Replacement Item
The ARTS IIE provides terminal surveillance data to ARTCC's via PAMRI.
Automated Radar Terminal System - Model IIE — (Track Data) → Radar Automated Display System
The ARTS associates surveillance data from the ASR with flight data and provides track data to the controller workstation RADS for display.
Automated Radar Terminal System - Model IIIA — (Flight Data) → Automated Radar Terminal System Color Display
The ACD displays ARTS flight data to the controller.
Automated Radar Terminal System - Model IIIA — (Track Data) → Automated Radar Terminal System Color Display
The ARTS sends track data to the ACD for controller use.
Automated Radar Terminal System - Model IIIA — (Track Data) → Full Digital Automated Radar Terminal System Display
Track data are exchanged between ARTS IIIA and the controller using FDAD.
Automated Radar Terminal System - Model IIIA — (Flight Data) → Host Computer System
The ARTS IIIA provides flight data to HCS via PAMRI.
Automated Radar Terminal System - Model IIIA — (Track Data) → Host Computer System
The ARTS IIIA provides surveillance data to HCS via PAMRI.
Automated Radar Terminal System - Model IIIA ← (Track Data) → Peripheral Adapter Module Replacement Item
The ARTS IIIA provides surveillance data to ARTCC's via PAMRI.
Automated Radar Terminal System - Model IIIE — (Flight Data) → Automated Radar Terminal System Color Display
The ACD displays ARTS flight data to the controller.
Automated Radar Terminal System - Model IIIE — (Track Data) → Automated Radar Terminal System Color Display
The ARTS sends track data to the ACD for controller use.
Automated Radar Terminal System - Model IIIE — (Track Data) → Full Digital Automated Radar Terminal System Display
Track data are exchanged between ARTS IIIE and the controller using FDAD.
Automated Radar Terminal System - Model IIIE — (Flight Data) → Host Computer System
The ARTS IIIE provides flight data to HCS via PAMRI.
Automated Radar Terminal System - Model IIIE — (Track Data) → Host Computer System
The ARTS IIIE provides surveillance data to HCS via PAMRI.
Automated Radar Terminal System - Model IIIE ← (Track Data) → Peripheral Adapter Module Replacement Item
The ARTS IIIE provides surveillance data to ARTCC's via PAMRI.
Enhanced Terminal Voice Switch — (Voice Communication) → Digital Voice Recorder System
This interface records and temporarily archives voice transmissions.
Enhanced Terminal Voice Switch ← (Voice Communication) → Enhanced Terminal Voice Switch
This interface enables ATC voice communication between controllers in same or different facilities.
Enhanced Terminal Voice Switch ← (Voice Communication) → Integrated Communications Switching System Type I
This interface enables ATC voice communication between controllers in different facilities.
Enhanced Terminal Voice Switch ← (Voice Communication) → Integrated Communications Switching System Type II
This interface enables ATC voice communication between controllers in different facilities.
Enhanced Terminal Voice Switch ← (Voice Communication) → Integrated Communications Switching System Type III
This interface enables ATC voice communication between controllers in different facilities.
Enhanced Terminal Voice Switch ← (Voice Communication) → Multi-Mode Digital Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Enhanced Terminal Voice Switch ← (Voice Communication) → Rapid Deployment Voice Switch Type I
This interface enables ATC voice communication between controllers in different facilities.
Enhanced Terminal Voice Switch ← (Voice Communication) → Rapid Deployment Voice Switch Type II
This interface enables ATC voice communication between controllers in different facilities.
Enhanced Terminal Voice Switch ← (Voice Communication) → Rapid Deployment Voice Switch Type IIA
This interface enables ATC voice communication between controllers in different facilities.
Enhanced Terminal Voice Switch ← (Voice Communication) → Small Tower Voice Switch
This interface enables ATC voice communication between controllers in different facilities.
Enhanced Terminal Voice Switch ← (Voice Communication) → Ultra High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Enhanced Terminal Voice Switch ← (Voice Communication) → Ultra High Frequency Ground Radios - Replacement
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Enhanced Terminal Voice Switch ← (Voice Communication) → Very High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Enhanced Terminal Voice Switch ← (Voice Communication) → Voice Switching and Control System
This interface enables ATC voice communication between controllers in different facilities.
Enhanced Terminal Voice Switch ← (Voice Communication) → Voice Switching and Control System Modification (Technological Refresh)
This interface enables ATC voice communication between controllers in different facilities.
Host Computer System ← (Flight Data) → Display System Replacement
The HCS sends flight data, time data, traffic management advisories to the DSR display and sends flight plans to the Flight

Strip Printer. HCS receives flight plan amendments from ATC via entries on the R-position DSR.

Host Computer System ⇐ (Track Data) ⇒ Display System Replacement

The HCS sends target fixes and track data to DSR and receives re-assignment of surveillance to sectors from ATCs as needed. (Note: the type of data passed to DSR is not raw surveillance data but rather is Target (fixes) and track (series of fixes) data produced by the HCS RDP.

Host Computer System — (Weather Data) ⇒ Display System Replacement

The HCS sends alphanumeric weather data to the DSR. Note: This is different from weather graphics, which is displayed on the DSR D-position from WARP.

Integrated Communications Switching System Type I — (Voice Communication) ⇒ Digital Voice Recorder System

This interface records and temporarily archives voice transmissions.

Integrated Communications Switching System Type I ⇐ (Voice Communication) ⇒ Integrated Communications Switching System Type I

This interface enables ATC voice communication between controllers in same or different facilities.

Integrated Communications Switching System Type I ⇐ (Voice Communication) ⇒ Integrated Communications Switching System Type II

This interface enables ATC voice communication between controllers in different facilities.

Integrated Communications Switching System Type I ⇐ (Voice Communication) ⇒ Integrated Communications Switching System Type III

This interface enables ATC voice communication between controllers in different facilities.

Integrated Communications Switching System Type I ⇐ (Voice Communication) ⇒ Multi-Mode Digital Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Integrated Communications Switching System Type I ⇐ (Voice Communication) ⇒ Rapid Deployment Voice Switch Type I

This interface enables ATC voice communication between controllers in different facilities.

Integrated Communications Switching System Type I ⇐ (Voice Communication) ⇒ Rapid Deployment Voice Switch Type II

This interface enables ATC voice communication between controllers in different facilities.

Integrated Communications Switching System Type I ⇐ (Voice Communication) ⇒ Rapid Deployment Voice Switch Type IIA

This interface enables ATC voice communication between controllers in different facilities.

Integrated Communications Switching System Type I ⇐ (Voice Communication) ⇒ Small Tower Voice Switch

This interface enables ATC voice communication between controllers in different facilities.

Integrated Communications Switching System Type I ⇐ (Voice Communication) ⇒ Ultra High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Integrated Communications Switching System Type I ⇐ (Voice Communication) ⇒ Ultra High Frequency Ground Radios - Replacement

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Integrated Communications Switching System Type I ⇐ (Voice Communication) ⇒ Very High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Integrated Communications Switching System Type I ⇐ (Voice Communication) ⇒ Voice Switching and Control System

This interface enables ATC voice communication between controllers in different facilities.

Integrated Communications Switching System Type I ⇐ (Voice Communication) ⇒ Voice Switching and Control System Modification (Technological Refresh)

This interface enables ATC voice communication between controllers in different facilities.

Integrated Communications Switching System Type II — (Voice Communication) ⇒ Digital Voice Recorder System

This interface records and temporarily archives voice transmissions.

Integrated Communications Switching System Type II ⇐ (Voice Communication) ⇒ Integrated Communications Switching System Type II

This interface enables ATC voice communication between controllers in same or different facilities.

Integrated Communications Switching System Type II ⇐ (Voice Communication) ⇒ Integrated Communications Switching System Type III

This interface enables ATC voice communication between controllers in different facilities.

Integrated Communications Switching System Type II ⇐ (Voice Communication) ⇒ Multi-Mode Digital Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Integrated Communications Switching System Type II ⇐ (Voice Communication) ⇒ Rapid Deployment Voice Switch Type I

This interface enables ATC voice communication between controllers in different facilities.

Integrated Communications Switching System Type II ⇐ (Voice Communication) ⇒ Rapid Deployment Voice Switch Type II

This interface enables ATC voice communication between controllers in different facilities.

Integrated Communications Switching System Type II ⇐ (Voice Communication) ⇒ Rapid Deployment Voice Switch Type IIA

This interface enables ATC voice communication between controllers in different facilities.

Integrated Communications Switching System Type II ⇐ (Voice Communication) ⇒ Small Tower Voice Switch

This interface enables ATC voice communication between controllers in different facilities.

Integrated Communications Switching System Type II ⇐ (Voice Communication) ⇒ Ultra High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Integrated Communications Switching System Type II ⇐ (Voice Communication) ⇒ Ultra High Frequency Ground Radios - Replacement

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Integrated Communications Switching System Type II ⇐ (Voice Communication) ⇒ Very High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Integrated Communications Switching System Type II ⇐ (Voice Communication) ⇒ Voice Switching and Control System

This interface enables ATC voice communication between controllers in different facilities.

Integrated Communications Switching System Type II ⇐ (Voice Communication) ⇒ Voice Switching and Control System Modification (Technological Refresh)

This interface enables ATC voice communication between controllers in different facilities.

Integrated Communications Switching System Type III — (Voice Communication) ⇒ Digital Voice Recorder System

This interface records and temporarily archives voice transmissions.

Integrated Communications Switching System Type III ⇐ (Voice Communication) ⇒ Integrated Communications Switching

System Type III
This interface enables ATC voice communication between controllers in same or different facilities.
Integrated Communications Switching System Type III ← (Voice Communication) → Multi-Mode Digital Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Integrated Communications Switching System Type III ← (Voice Communication) → Rapid Deployment Voice Switch Type I
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type III ← (Voice Communication) → Rapid Deployment Voice Switch Type II
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type III ← (Voice Communication) → Rapid Deployment Voice Switch Type IIA
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type III ← (Voice Communication) → Small Tower Voice Switch
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type III ← (Voice Communication) → Ultra High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Integrated Communications Switching System Type III ← (Voice Communication) → Ultra High Frequency Ground Radios - Replacement
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Integrated Communications Switching System Type III ← (Voice Communication) → Very High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Integrated Communications Switching System Type III ← (Voice Communication) → Voice Switching and Control System
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type III ← (Voice Communication) → Voice Switching and Control System Modification (Technological Refresh)
This interface enables ATC voice communication between controllers in different facilities.
Multi-Mode Digital Radios ← (Voice Communication) → Radio Control Equipment
Multi-Mode Digital Radios ← (Voice Communication) → Very High Frequency Airborne Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Multi-Mode Digital Radios ← (Voice Communication) → Very High Frequency Multi-Mode Airborne Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Peripheral Adapter Module Replacement Item — (Flight Data) → Host Computer System
The PAMRI is a conduit through which the HCS receives and exchanges flight data with remote FDIO flight strip printer system (printer/display/keyboard) as well as with external automation systems such as ARTS/STARS (TRACON), ODAPS/FDP2000 (Ocean), and FSM (ATCSCC). FDIO uses the General Purpose Input/Output (GPI/O) parallel interfaces and automation systems use the Interfacility Communications Input/Output (INTI/O) serial interfaces.
Peripheral Adapter Module Replacement Item — (Surveillance Data) → Host Computer System
The PAMRI passes surveillance data from the primary/secondary radars to the HCS for processing and use in controlling aircraft.
Peripheral Adapter Module Replacement Item — (Flight Data) → Peripheral Adapter Module Replacement Item
The PAMRI passes flight data between ARTCCs.
Peripheral Adapter Module Replacement Item — (Track Data) → Peripheral Adapter Module Replacement Item
The PAMRI passes track data between ARTCCs.
Radio Control Equipment ← (Voice Communication) → Enhanced Terminal Voice Switch
Radio Control Equipment ← (Voice Communication) → Integrated Communications Switching System Type I
Radio Control Equipment ← (Voice Communication) → Integrated Communications Switching System Type II
Radio Control Equipment ← (Voice Communication) → Integrated Communications Switching System Type III
Radio Control Equipment ← (Data Communication) → Radio Control Equipment
Radio Control Equipment ← (Voice Communication) → Rapid Deployment Voice Switch Type I
Radio Control Equipment ← (Voice Communication) → Rapid Deployment Voice Switch Type II
Radio Control Equipment ← (Voice Communication) → Rapid Deployment Voice Switch Type IIA
Radio Control Equipment ← (Voice Communication) → Small Tower Voice Switch
Radio Control Equipment ← (Voice Communication) → Voice Switching and Control System
Radio Control Equipment ← (Voice Communication) → Voice Switching and Control System Modification (Technological Refresh)
Rapid Deployment Voice Switch Type I — (Voice Communication) → Digital Voice Recorder System
This interface records and temporarily archives voice transmissions.
Rapid Deployment Voice Switch Type I ← (Voice Communication) → Multi-Mode Digital Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Rapid Deployment Voice Switch Type I ← (Voice Communication) → Rapid Deployment Voice Switch Type I
This interface enables ATC voice communication between controllers in same or different facilities.
Rapid Deployment Voice Switch Type I ← (Voice Communication) → Rapid Deployment Voice Switch Type II
This interface enables ATC voice communication between controllers in different facilities.
Rapid Deployment Voice Switch Type I ← (Voice Communication) → Rapid Deployment Voice Switch Type IIA
This interface enables ATC voice communication between controllers in different facilities.
Rapid Deployment Voice Switch Type I ← (Voice Communication) → Small Tower Voice Switch
This interface enables ATC voice communication between controllers in different facilities.
Rapid Deployment Voice Switch Type I ← (Voice Communication) → Ultra High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Rapid Deployment Voice Switch Type I ← (Voice Communication) → Ultra High Frequency Ground Radios - Replacement
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Rapid Deployment Voice Switch Type I ← (Voice Communication) → Very High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Rapid Deployment Voice Switch Type I ← (Voice Communication) → Voice Switching and Control System
This interface enables ATC voice communication between controllers in different facilities.
Rapid Deployment Voice Switch Type I ← (Voice Communication) → Voice Switching and Control System Modification

(Technological Refresh)
This interface enables ATC voice communication between controllers in different facilities.
Rapid Deployment Voice Switch Type II — (Voice Communication) → Digital Voice Recorder System
This interface records and temporarily archives voice transmissions.
Rapid Deployment Voice Switch Type II ← (Voice Communication) → Multi-Mode Digital Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Rapid Deployment Voice Switch Type II ← (Voice Communication) → Rapid Deployment Voice Switch Type II
This interface enables ATC voice communication between controllers in same or different facilities.
Rapid Deployment Voice Switch Type II ← (Voice Communication) → Rapid Deployment Voice Switch Type IIA
This interface enables ATC voice communication between controllers in different facilities.
Rapid Deployment Voice Switch Type II ← (Voice Communication) → Small Tower Voice Switch
This interface enables ATC voice communication between controllers in different facilities.
Rapid Deployment Voice Switch Type II ← (Voice Communication) → Ultra High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Rapid Deployment Voice Switch Type II ← (Voice Communication) → Ultra High Frequency Ground Radios - Replacement
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Rapid Deployment Voice Switch Type II ← (Voice Communication) → Very High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Rapid Deployment Voice Switch Type II ← (Voice Communication) → Voice Switching and Control System
This interface enables ATC voice communication between controllers in different facilities.
Rapid Deployment Voice Switch Type II ← (Voice Communication) → Voice Switching and Control System Modification (Technological Refresh)
This interface enables ATC voice communication between controllers in different facilities.
Rapid Deployment Voice Switch Type IIA — (Voice Communication) → Digital Voice Recorder System
This interface records and temporarily archives voice transmissions.
Rapid Deployment Voice Switch Type IIA ← (Voice Communication) → Multi-Mode Digital Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Rapid Deployment Voice Switch Type IIA ← (Voice Communication) → Rapid Deployment Voice Switch Type IIA
This interface enables ATC voice communication between controllers in same or different facilities.
Rapid Deployment Voice Switch Type IIA ← (Voice Communication) → Small Tower Voice Switch
This interface enables ATC voice communication between controllers in different facilities.
Rapid Deployment Voice Switch Type IIA ← (Voice Communication) → Ultra High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Rapid Deployment Voice Switch Type IIA ← (Voice Communication) → Ultra High Frequency Ground Radios - Replacement
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Rapid Deployment Voice Switch Type IIA ← (Voice Communication) → Very High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Rapid Deployment Voice Switch Type IIA ← (Voice Communication) → Voice Switching and Control System
This interface enables ATC voice communication between controllers in different facilities.
Rapid Deployment Voice Switch Type IIA ← (Voice Communication) → Voice Switching and Control System Modification (Technological Refresh)
This interface enables ATC voice communication between controllers in different facilities.
Small Tower Voice Switch — (Voice Communication) → Digital Voice Recorder System
This interface records and temporarily archives voice transmissions.
Small Tower Voice Switch ← (Voice Communication) → Multi-Mode Digital Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Small Tower Voice Switch ← (Voice Communication) → Small Tower Voice Switch
This interface enables ATC voice communication between controllers in same or different facilities.
Small Tower Voice Switch ← (Voice Communication) → Ultra High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Small Tower Voice Switch ← (Voice Communication) → Ultra High Frequency Ground Radios - Replacement
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Small Tower Voice Switch ← (Voice Communication) → Very High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Small Tower Voice Switch ← (Voice Communication) → Voice Switching and Control System
This interface enables ATC voice communication between controllers in different facilities.
Small Tower Voice Switch ← (Voice Communication) → Voice Switching and Control System Modification (Technological Refresh)
This interface enables ATC voice communication between controllers in different facilities.
Ultra High Frequency Ground Radios ← (Voice Communication) → Ultra High Frequency Airborne Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Ultra High Frequency Ground Radios - Replacement ← (Voice Communication) → Ultra High Frequency Airborne Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Very High Frequency Ground Radios ← (Voice Communication) → Very High Frequency Airborne Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Very High Frequency Ground Radios ← (Voice Communication) → Very High Frequency Multi-Mode Airborne Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Voice Switching and Control System — (Voice Communication) → Digital Voice Recorder System
This interface records and temporarily archives voice transmissions.
Voice Switching and Control System ← (Voice Communication) → Multi-Mode Digital Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Voice Switching and Control System ← (Voice Communication) → Ultra High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Voice Switching and Control System ← (Voice Communication) → Ultra High Frequency Ground Radios - Replacement
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Voice Switching and Control System ← (Voice Communication) → Very High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Voice Switching and Control System ← (Voice Communication) → Voice Switching and Control System
This interface enables ATC voice communication between controllers in same or different facilities.
Voice Switching and Control System ← (Voice Communication) → Voice Switching and Control System Modification (Technological Refresh)
This interface enables ATC voice communication between controllers in different facilities.
Voice Switching and Control System Modification (Technological Refresh) — (Voice Communication) → Digital Voice Recorder System
This interface records and temporarily archives voice transmissions.
Voice Switching and Control System Modification (Technological Refresh) ← (Voice Communication) → Multi-Mode Digital Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Voice Switching and Control System Modification (Technological Refresh) ← (Voice Communication) → Ultra High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Voice Switching and Control System Modification (Technological Refresh) ← (Voice Communication) → Ultra High Frequency Ground Radios - Replacement
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Voice Switching and Control System Modification (Technological Refresh) ← (Voice Communication) → Very High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Voice Switching and Control System Modification (Technological Refresh) ← (Voice Communication) → Voice Switching and Control System Modification (Technological Refresh)
This interface enables ATC voice communication between controllers in same or different facilities.

Issues

none identified

Service Group Air Traffic Services
Service ATC-Separation Assurance
Capability Aircraft to Aircraft Separation Capability
Operational Improvement

Current En Route Separation (102112)

Aircraft to aircraft separation services in en route airspace ensure a safe distance is maintained between aircraft. Air traffic controllers apply separation standards defined for the different aircraft operating environments to guide pilots flying under instrument or visual flight rules. They separate aircraft under their control using standard rules for vertical, lateral, longitudinal, or visual separation. When potential conflicts exist, an air traffic controller evaluates the situation, develops conflict resolution alternatives, and alerts or issues separation instructions to the aircraft.
01-Jul-2004 to 01-Jan-2010

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Separation standards applied in en route airspace consist of rules and procedures for separating aircraft operating under Instrument Flight Rules (IFR) from each other, from protected airspace, and from terrain. En route airspace is classified as Class A airspace, Class E airspace, or Class G airspace. The DSR (Display System Replacement) is the en route controller workstation. The DSR presents a radar display, weather display, airway maps, sector boundaries, adjacent facility boundaries, restricted areas, prohibited areas, or sector-specific information for the controller to provide air traffic services in that sector. Radar controllers must constantly scan radar data and flight data to determine aircraft position, accomplish traffic planning, and resolve conflicts. This constant scanning provides the controller with an updated traffic picture to issue clearances to aircraft so they remain conflict-free. This awareness allows the controller to provide timely radar handoffs, traffic advisories, radar point-outs, and communication transfers. The controller also uses scanning to monitor compliance with clearances already delivered.

The controller accomplishes en route IFR separation by applying one or a combination of radar, non radar, or visual separation rules. Radar separation is the preferred method; however, controllers are trained to apply the type of separation that will provide the greatest operational advantage.

Radar separation standards are based on the equipment adaptation (single radar site or multiple radar sites) and the distance of aircraft from the radar antenna site. The general en route standard is 5 nautical miles (NM) between aircraft at the same altitude. Most of the en route airspace has radar coverage. In some mountainous areas radar coverage is not available below certain altitudes. In these areas, controllers apply non radar rules to separate aircraft. This type of separation is still used exclusively in areas with no radar coverage and during radar failures. Non radar separation can be vertical, longitudinal, or lateral separation.

Controllers apply vertical separation by assigning different altitudes 1,000 feet apart to a pair of aircraft operating at or below Flight Level (FL) 290. Above FL290, the standard increases to 2,000 feet apart. Controllers assign an aircraft to an available altitude or after an aircraft previously at that altitude has reported leaving that altitude. As a general rule, aircraft flying south or west are assigned even cardinal altitudes and aircraft flying north or east are assigned odd cardinal altitudes. (Cardinal altitudes are odd or even thousand-foot altitudes or flight levels (e.g., 5,000, 6,000, and 7,000 feet, or FL 250, FL 260, FL 270).

Controllers apply longitudinal separation rules to ensure that no more than one aircraft occupies a geographic location at the same time and at the same altitude. Longitudinal separation can be applied to aircraft on the same, converging, or crossing courses. This type of separation can use the speed difference between the aircraft and can be expressed in miles or in minutes from a fix or an airport. Lateral separation is applied by assigning different routings or holding patterns that do not overlap to a pair of aircraft. Lateral separation can also be applied to departing aircraft using diverging headings. Visual separation is a clearance from the controller to the pilot that allows the pilot to visually separate his/her aircraft from another aircraft below FL180. The reported weather in the vicinity must be good enough for the pilot to maintain visual contact with the other aircraft.

Controllers obtain the flight data and radar data used to provide separation services between aircraft from various Federal Aviation Administration automated systems. There are both primary and backup systems. The host computer is the primary system that presents the radar display to the controller. In the event of a malfunction, the controller can switch to the backup system, Enhanced Direct Access Radar Channel that operates separately but in tandem with the host computer. Letters of agreement and local procedures between adjacent facilities, contained in standard operating procedures within a facility, can modify en route separation standards. These letters and procedures cannot reduce separation standards as developed and published at the national level, but they can increase the standards. These letters and procedures are generally used to ensure that controllers understand what to expect from aircraft coming from an adjacent facility or from an adjacent controller within their own facility.

Separation standards are published rules that must be followed and maintained. As prescribed by Federal Aviation Administrative directives, both en route and terminal controllers receive en route separation standards instruction.

Obtaining the required separation may require innovation. Once the required separation is obtained, it must be maintained. There are several times in each flight when a change from one type of separation standard to another must be accomplished. The change can be a result of transitioning from one type of airspace to another or transitioning routes and/or altitudes. Proper application of the separation standards can increase the capacity of the National Airspace System (NAS) without changing the separation standard. Procedures are sometimes changed as new separation standards are issued, traffic increases/decreases, or as evaluation of procedures mandates. As new equipment and controller aides are introduced, the human factor and system-human interaction must be considered before controller training is implemented.

Certain information about each aircraft and its intended flight plan are required to provide en route separation and to accomplish point-outs, handoffs, and coordination. The aircraft's call sign and flight number or the aircraft's registration number is required to communicate separation clearances to the flight. The aircraft type is required information as certain en route separation standards change based on aircraft size. Routes of flight and altitude are necessary to apply lateral or vertical en route separation. Estimated times over navigational fixes are required for non radar separation.

Flight data to provide en route separation originates with the pilot or the pilots' company. This data is generally in the format of a Federal Aviation Administration (FAA) flight plan. The flight data enters the Host Computer System Replacement (HOCSR) through Automated Flight Service Stations (AFSS), military base operations (BASOPS), Direct User Access Terminal System, commercial vendors on the Internet, Airline Operations Center (AOC) pre filed flight plans, or directly from an FAA facility that has direct access to the NAS computer system. Flight data is provided by automated means to the en route controller. Generally, this data is in the form of printed flight progress strips from the Flight Data Input/Output (FDIO) equipment or from computer update or readout messages on the Display System Replacement (DSR) console. Controllers can update or amend the flight database as necessary.

The radar system being used and/or the distance from the radar site that an aircraft is located can determine en route separation standards. Generally, en route radar, such as Air Route Surveillance Radar-3 or -4, comes from multiple sites and is adapted to process the best target data available from the multiple radar sites (mosaic radar adaptation). Radar separation in these instances is 5 NM between aircraft at the same altitude. Certain en route sectors are allowed to use radar separation of 3 NM between aircraft at the same altitude to increase capacity and efficiency. To use this reduced separation a single radar site must be adapted as the sole data input, and the radar separation must occur within 40 NM of that radar antenna site.

The Voice Switching Control System is the en route air/ground and ground/ground radio communication system used to issue clearance instructions to aircraft and monitor compliance. Ground/ground communications are used to coordinate airspace status, relay control instructions, and to complete sector-to-sector and facility-to-facility coordination. Direct radio communications between pilots and controllers are required to use certain en route separation standards. In visual separation, the controller must be in direct radio contact with at least one of the pilots of aircraft being authorized to apply visual separation standards. To use radar vectors to establish lateral separation between a pair of aircraft, the controller must be able to communicate with a minimum of one of the aircraft. In certain instances, direct radio communications between the en route controller and the pilot are not possible. In these Situations, information and clearances can be relayed via an AFSS, AOC, BASOPS, or over the voice capability of a VOR.

Current weather data is needed to obtain the altimeter setting to define the lowest useable flight level. Pilot reports (PIREPS) of clear air turbulence and rough rides at certain altitudes let the controller know which altitudes to assign aircraft. The location and movement of thunderstorm cells allow the controller to assist the pilot in finding the best routes around the weather. This knowledge of convective weather also allows controllers to plan future separation tasks. The controller and pilot also require current weather information to determine which separation standards may be applied to aircraft and the type of approach an aircraft can fly. The type of approach an aircraft can fly determines sequencing separation from a previous or subsequent arrival. The en route controller obtains the weather via PIREPS, FDIO messages, and DSR message readouts. The National Weather Service meteorologist at the Center Weather Service Unit provides certain weather to the en route controller via FDIO or relayed through the controller's supervisor. Hourly weather reports and periodic winds aloft data enter the HOCSR via National Airspace Data Interchange Network.

The traffic management mission is to balance air traffic demand with system capacity to ensure maximum efficient use of the

NAS. To manage demand, it is sometimes necessary to place restrictions on aircraft to remain within the system's capacity. Historically Validated Restrictions and dynamic traffic management incentives become de facto en route separation standards. Controllers must enforce these restrictions in their area of responsibility. These increases to the separation standard are generally arrival airport sensitive. Adverse weather in an en route sector can also cause separation minima to increase for all aircraft entering that en route sector for a certain period of time.

Benefits

Current operations are provided in the NAS.

Systems

Air Route Surveillance Radar - Model 1E (key system)

The Air Route Surveillance Radar - Model 1E (ARSR-1E) is a 1970s analog radar. It is a long-range radar system with a maximum detection range of 200 nm. The ARSR-1E is a surveillance system used to detect azimuth and slant range of en route aircraft operating between terminal areas. It also provides weather intensity data.

Air Route Surveillance Radar - Model 2 (key system)

The Air Route Surveillance Radar - Model 2 (ARSR-2) is a 1970s analog radar. It is a long-range radar system with a maximum detection range of 200 nm. The ARSR-2 is a surveillance system used to detect azimuth and slant range of en route aircraft operating between terminal areas. It also provides weather intensity data.

Air Route Surveillance Radar - Model 3 (key system)

The Air Route Surveillance Radar - Model 3 (ARSR-3) is a 1980s radar that provides primary long range surveillance data, including slant range and azimuth data. It processes the returns which includes demodulation, analog-to-digital conversion, moving target indicator function, sensitivity time control, range and azimuth gating, and digital target extraction - all of which are performed digitally (with the exception of the demodulation and analog-to-digital conversion). In addition, the ARSR-3 has a weather channel with associated processing to provide weather contour information in digital format.

Air Route Surveillance Radar - Model 4 (key system)

The Air Route Surveillance Radar - Model 4 (ARSR-4) is a three-dimensional, long-range, rotating phased array, primary surveillance radar with integrated height finder capability. It is part of the joint surveillance system (JSS) used in conjunction with ARSR-3 coverage as part of the nationwide air defense command surveillance network. In addition to functions peculiar to the military, the ARSR-4 performs the same basic functions of the ARSR-3, by providing primary long-range surveillance data, including slant range and azimuth data.

Air Traffic Control Beacon Interrogator - Model 4 (key system)

The Air Traffic Control Beacon Interrogator - Model 4 (ATCBI-4) is an air traffic control (ATC) beacon system that interrogates transponder-equipped aircraft. It is a secondary radar system that interrogates transponders, receives aircraft identification, and determines position data.

Air Traffic Control Beacon Interrogator - Model 5 (key system)

The Air Traffic Control Beacon Interrogator - Model 5 (ATCBI-5) is an air traffic control (ATC) beacon system that interrogates transponder-equipped aircraft. It is a secondary radar system that interrogates transponders, receives aircraft identification, and determines position data.

Air Traffic Control Beacon Interrogator - Model 6 (key system)

The Air Traffic Control Beacon Interrogator Model 6 (ATCBI-6) is a ground-based system that interrogates transponders, receives and processes replies from transponders, determines the range and azimuth to the aircraft, and forwards the information to appropriate air traffic control (ATC) automation systems. Replies provide identification and altitude data of the transponder.

Airport Surveillance Radar - Model 11

The Airport Surveillance Radar- Model 11 (ASR-11) is a digital, combined primary and secondary surveillance radar (SSR), short-range radar system with a 60 nautical mile (nmi) detection range for medium and small activity airports. The ASR-11 provides advanced digital primary radar including weather intensity surveillance with an integrated monopulse SSR system for use in the airport terminal area. The ASR-11 is used to detect and report the presence and location of an aircraft in a specific volume of airspace. The ASR-11 provides search radar surveillance coverage in controlled airspace primarily in terminal areas.

Airport Surveillance Radar - Model 7

The Airport Surveillance Radar - Model 7 (ASR-7) is a short-range (60 nm) analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the Air Traffic Control Beacon Interrogator - Model 4 or Model 5 (ATCBI-4 or ATCBI-5) or Mode S. This system will be replaced by the ASR-11.

Airport Surveillance Radar - Model 8

The Airport Surveillance Radar - Model 8 (ASR-8) is a short-range (60 nm), analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the Air Traffic Control Beacon Interrogator - Model 4 or Model 5 (ATCBI-4 or ATCBI-5) or Mode S.

Airport Surveillance Radar - Model 9

The Airport Surveillance Radar - Model 9 (ASR-9) is a short range (60 nm) radar system for the airport terminal area. The ASR-9 processes the returns from aircraft targets, which includes demodulation, analog-to-digital conversion, range and azimuth gating, sensitivity timing control, and a moving target detection function. The moving target detector includes two-level weather contour processing, digital signal processing, correlation and interpolation processing, and surveillance processing. The ASR-9 has a separate weather channel with associated processing capable of providing six-level weather contours. The two-level weather contour processing associated with the moving target detector is only be used for backup. The six-level weather channel is primarily used to supplement Next Generation Weather Radar (NEXRAD) coverage. It is normally used in conjunction with Mode Select (Mode S) but it can accommodate an Air Traffic Control Beacon Interrogator Model 4/5 (ATCBI-4/5).

The ASR-9 will be upgraded/replaced with the ASR-9/Mode S SLEP (see separate mechanism) in the 2007-12 time frame.

Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program)

The Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) (ASR-9/Mode S (SLEP)) mechanism provide the necessary technical refresh to extend the service life of the ASR-9 and Mode S through 2030. The ASTERIX upgrade has not been implemented, but will be implemented at a later date.

Airport Surveillance Radar, Military

The GPN-20 radar is a military short-range (60 nm) analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the TPX-42 military beacon (interrogate friend or foe, IFF). The GPN-20 is the military version of the FAAs ASR-7/8.

Alaskan National Airspace System Interfacility Communications System (key system)

Alaskan NAS Interfacility Communications System (ANICS) uses FAA-owned satellite earth stations and leased transponders on communications satellites to provide reliable telecommunication services. ANICS Phase I sites provide critical communications with 99.99% availability by using two sets of equipment and two satellites in parallel. ANICS Phase II sites will provide essential communications with 99.9% availability by using one set of equipment and one satellite. ANICS Phase II uses commercial off-the-shelf (COTS) equipment in a redundant configuration to provide high availability and reliability. Phase II sites are enclosed in radomes that protect the equipment and antenna from the weather. The ANICS equipment provides remote maintenance monitoring and control. The equipment is controlled and operated from the Network Operations Control Center (NOCC), centrally located in the Anchorage ARTCC.

Automatic Dependent Surveillance (Capstone) Ground Station

The Automatic Dependent Surveillance (Capstone) Ground Station (ADS (Cap) Ground Station) is a demonstration system used by the Capstone project under Safe Flight 21. It receives Global Positioning System (GPS)-derived aircraft four (4)-dimensional position data, aircraft identification, aircraft velocity, and other selected aircraft data for processing at ATC facilities, and transmits Traffic Information System - Broadcast (TIS-B) information on aircraft in areas of radar coverage (and other airspace status information when available) to properly to equipped aircraft, to support operational trials. These ground stations are located in remote locations in Alaska, and feed the Anchorage Air Route Traffic Control Center (ARTCC) automation system.

Automatic Dependent Surveillance (Safe Flight 21) Ground Station

The Automatic Dependent Surveillance (Safe Flight 21) Ground Station (ADS (SF-21) Ground Station) is a demonstration system used by the Ohio Valley project under the Safe Flight 21 program. It receives Global Positioning System (GPS)-derived aircraft four (4)-dimensional position data, aircraft identification, aircraft velocity, and other selected aircraft data for processing at selected ATC facilities, and transmits Traffic Information System - Broadcast (TIS-B) information on aircraft in areas of radar coverage (and other airspace status information when available) to properly to equipped aircraft, to support SF-21 operational trials. These ground stations will be located in the regions surrounding Memphis, TN and Louisville, KY, and interface with developmental surveillance processing systems.

Automatic Dependent Surveillance - Broadcast (Capstone) Avionics

Automatic Dependent Surveillance - Broadcast (Capstone) Avionics (ADS-B (Cap) Avionics) are the surveillance avionics used by the Capstone project under Safe Flight 21. These are demonstration avionics that are used to support ADS-B-related operational trials in Alaska.

Digital Airport Surveillance Radar

The Digital Airport Surveillance Radar (DASR) provides advanced digital primary radar including weather intensity surveillance with an integrated mono-pulse Secondary Surveillance Radar (SSR) system for use in the airport terminal area. (Military version of ASR-11)

Digital Voice Recorder System (key system)

Provides modern digital voice recording devices used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

In Feburary 2004, the DVRS was upgraded with a 24-channel card, which replaced the 16-channel card. This minor upgrade, called DVR II, was not extended to the systems installed prior to February 2004.

Digital Voice Recorder System Replacement

The Digital Voice Recorder System Replacement (DVRS Replacement) is a modern digital system used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

Direct Access Radar Channel

The Direct Access Radar Channel (DARC) provides a back-up processing path to provide surveillance data to the displays in the event of a primary channel (Host Computer System (HCS) failure. The DARC path is a physically, logically and electrically separate processing path (with diverse hardware and software) from the primary Host Computer System (HCS) Radar Data Processing (RDP) paths. Thus DARC provides a tertiary path, to keep radar data on the controller''s displays, should both HCS RDP paths be disabled for any reason. The DARC provides radar data processing, very limited flight data processing, but with significantly less functionality than the HCS. Basically, DARC serves as a lifeboat should both HCS processing paths become disabled.

Display System Replacement (key system)

The Display System Replacement (DSR) provides continuous real-time, automated support to air traffic controllers for the display of surveillance, flight data and other critical control information. This information is processed by the Host and Oceanic Computer System Replacement (HOCSR) and the Enhanced Direct Access Radar Channel (EDARC) subsystems. The DSR provides controller workstations, displays, and input/output devices and a communications infrastructure to connect the DSR with external processing elements of the en route ATC automation system.

Emergency Voice Communications System (key system)

The Emergency Voice Communications System (EVCS) is located at Headquarters (HQ), Regional Offices, several Air Route Traffic Control Centers (ARTCCs), Terminal Radar Approach Control (TRACON) facilities, and other selected sites. EVCS uses two (2) dedicated Federal Telecommunications Service 2001 (FTS2001) dial access channels at most FAA locations. Dedicated dial lines using the Public Switched Telephone Network (PSTN) are used at locations not having direct access to FTS2001. Supports HQ and Regional Communications Command Centers'' functions for accident and incident reports, hijacks, aircraft crashes, aviation security matters, military activities, natural disasters, etc.

Enhanced Back-up Surveillance

The Enhanced Back-Up Surveillance (EBUS) system replaces the DARC system in use at the 20 Air Route Traffic Control Centers (ARTCC) in the contiguous United States (CONUS), the William J. Hughes Technical Center (WJHTC), and the FAA Academy (FAAAC). The EBUS design employs the existing FAA-certified software of the Microprocessor En Route Automated Radar Tracking System (Micro-EARTS) application to provide radar data processing (RDP) services for the replacement legacy backup system. Micro-EARTS provides key capabilities not supported by the DARC legacy system it replaces, among which are the safety functions of Conflict Alert (CA), Mode-C Intruder (MCI), and Minimum Safe Altitude

Warning (MSAW). EBUS also provides Next Generation Radar (NEXRAD) weather data to R-position users via the DSR Backup Communications Network (BCN). EBUS makes the R-position functionality on the backup channel more comparable to that of the primary channel.

The EBUS software (Micro EARTS) and the ECG backup gateway software will share the same hardware platform such that both software functions will reside in the same ECG backup gateway hardware platform.

Fixed Position Surveillance - Model 117

The Fixed Position Surveillance - Model 117 (FPS-117) radar is a joint-use military surveillance system used by the FAA to detect slant range and azimuth of en route aircraft. These radars are located in Alaska (12) and Hawaii (1), and are expected to be sustained until at least 2020.

Fixed Position Surveillance Model 20 Series

The Fixed Position Surveillance Model 20 Series (FPS-20 Series) is a military primary radar of various models (FPS-20A, FPS-64, FPS-66A, FPS-67/A/B, and ARSR-60M) used by the FAA to detect slant range and azimuth of en route aircraft operating between terminals in the continental United States. Each of the different radar models is a similar variation of the original FPS-20 military radar.

Flight Data Input/Output

The Flight Data Input/Output (FDIO) system provides flight progress information for use by the Tower, Terminal Radar Approach Control (TRACON) and Air Route Traffic Control Center (ARTCC) controllers. The FDIO system allows Air Traffic Control (ATC) Specialists to input automated flight data, perform data manipulation, and print flight strips.

Heating, Ventilation and Air Conditioning - Long-Range Radar (key system)

The Heating, Ventilation and Air Conditioning - Long-Range Radar (HVAC - LRR) mechanism provides the systems to maintain the temperature and relative humidity within the facility at acceptable levels for LRR system operation or personnel comfort as required. This includes filtering of air to Occupational Safety and Health Administration (OSHA) requirements.

High Frequency Airborne Radios (key system)

High Frequency (HF) Airborne Radios are analog (HF multi-channel radio transceivers operating in the 2 - 30 Mhz frequency band installed in airborne commercial, cargo, and military aircraft transiting the oceanic, en route, terminal, or flight service station airspace domains. These transceivers are typically used in transoceanic applications.

High Frequency Ground Radios (key system)

High Frequency (HF) Ground Radios are analog HF radio devices operating in the 2 - 30 Mhz frequency band, which may be single channel transmitters and receivers or multi-channel transceivers. These radio devices are installed at oceanic and en route facilities and used to support tactical air traffic control (ATC) voice communications between a ground controller and a pilot in an aircraft in the oceanic domain. Additionally, these devices are also installed at regional facilities and used to support voice command and control communications /coordination in emergency or during disaster recovery situations occurring in the NAS.

Host Computer System

The Host Computer System (HCS) receives and processes surveillance reports, and flight plan information. The HCS sends search/beacon target, track and flight data, surveillance and alphanumeric weather information, time data, traffic management advisories and lists to the (Display System Replacement) DSR. The HCS associates surveillance-derived tracking information with flight-planning information. The DSR sends requests for flight data, flight data updates, and track control messages to the HCS. HCS-generated display orders are translated for use within the DSR workstation. While radar data processing is distributed among the terminal and En Route computer resources, the HCS performs virtually all of the flight data processing for its entire geographical area of responsibility. Every tower (ATCT) and terminal radar approach control (TRACON) relies exclusively on its parent HCS for flight data.

The HCS also runs algorithms that perform aircraft to aircraft (conflict alert) and aircraft to terrain (Minimum Safe Altitude Warning) separation assurance. The HCS algorithms provide visual and audible alerting to the controller when conflicts are identified.

The HCS presently supplies real time surveillance, flight data and other information to several decision support tools housed in collocated outboard processors connected via two-way high bandwidth links to the HCS and DSR. These are the (User Request Evaluation Tool, (URET), and the Traffic Management Advisory (TMA. URET performs probing of tentative flight plan changes to determine their viability. TMA provides sequencing and spacing information to align the aircraft in En Route airspace for approach.

Leased Inter-facility National Airspace System Communication System

The Leased Inter-facility National Airspace System Communication System (LINCS) provides transmission channels of various industry-standard types between any specified end points, used to satisfy all FAA operational and some administrative telecommunication requirements.

Low-Density Radio Communications Link (key system)

The Low-Density Radio Communications Link (LDRCL) is an FAA owned Low-Density Radio Communications Link (LDRCL) satisfies short-haul, low-density communication requirements. It provides user access (via tail circuits) to a Radio Communications Link (RCL) site or connectivity between two operational facilities

Microprocessor-En Route Automated Radar Tracking System (key system)

The Microprocessor-En Route Automated Radar Tracking System (Micro-EARTS) is a radar processing system implemented with Commercial Off-the-Shelf (COTS) equipment, for use in both En Route and Terminal environments. It provides single sensor and a mosaic display of traffic and weather using long- and short-range radars. At Anchorage, Alaska, Micro-EARTS also provides Automatic Dependent Surveillance-Broadcast (ADS-B) surveillance and display. Micro-EARTS interfaces with multiple types of displays, including Display System Replacement (DSR), Digital Bright Radar Indicator Tower Equipment (DBRITE), and the flat panel tower controller displays.

Mode 3/AC Transponder

A Mode 3/AC Transponder (Mode 3/AC XPNDR) is a device that responds to an Air Traffic Control Radar Beacon System (ATCRBS) or Mode S interrogation by transmitting a 12-bit code that identifies an aircraft. Mode 3 is the military identity mode. Mode A is the civil identity mode. Mode 3 and Mode A are reported in identical formats and are called Mode 3/A. The Mode 3/A code in the field consists of 12-bits divided into four groups (A, B, C, and D) of three bits each. The Mode

3/A identity code consists of only four digits, each digit being the octal representation of one of the four groups in the field and listed in the order ABCD. A Mode C transponder is a device that responds to a Air Traffic Control Radar Beacon System (ATCRBS) or a Mode Select (Mode S) interrogation by transmitting an altitude gray code from the aircraft blind altitude encoder.

Mode Select Transponder

The Mode Select Transponder (Mode S Transponder) is an avionics system that responds to 1,030 MHz interrogations from ground-based sensors or Traffic Alert and Collision Avoidance System (TCAS) airborne avionics with 1,090 MHz replies containing aircraft identification, altitude, and other selected data. Mode S transponders offer improvements over conventional Air Traffic Control Radar Beacon System (ATCRBS) transponders in that they provide over 16 million unique beacon codes, can be selectively interrogated to prevent overlapping or garbling of replies from proximate aircraft, and can provide a high-capacity air-ground data link. In addition to responding to "all call" or "roll call" interrogations from ground-based sensors or TCAS avionics, the Mode S transponders are required to transmit or squitter their 24-bit unique identity and altitude once per second. These squitters are "voluntary" or automatic and not in response to any interrogation. The squitters allow TCAS avionics in proximate aircraft or other systems to acquire Mode S equipped aircraft by only listening on 1,090 MHz.

Multi-Mode Digital Radios (key system)

Multi-Mode Digital Radios (MDRs) are ground-based Very High Frequency (VHF) air-traffic-control radios that can operate in several configurations: 1) analog voice with 25kHz channel spacing; 2) analog voice with 8.33 kHz channel spacing; and 3) VHF Data Link (VDL) Mode-3 which consists of two-way digital voice and data communication.

Peripheral Adapter Module Replacement Item

The Peripheral Adapter Module Replacement Item (PAMRI) is an interface peripheral to the HOCSR. It provides a conduit through which the HOCSR receives and exchanges data, primarily radar data, flight data and interfacility data. The PAMRI converts communication protocols and translates data formats so the Host and EDARC can communicate with external devices.

Power System - Long-Range Radar (key system)

The Power System - Long-Range Radar (Pwr Sys - LRR) mechanism provides conditioning of commercial power, including uninterruptible power systems (UPS), to eliminate voltage dropouts, surges, and voltage sags caused by sources outside the facility. Power distribution, grounding, bonding and shielding of electrical system within the facility is also part of the Pwr Sys - LRR.

Radio Communication Link (key system)

Radio Communication Link (RCL) is an integrated voice and data microwave transmission system designed to provide the FAA with cost effective and reliable service for its high capacity NAS communications routes. RCL interconnects air route traffic control center (ARTCC) facilities with long range radar installations and other air traffic control (ATC) facilities.

Radio Control Equipment (key system)

Radio Control Equipment (RCE), located at both ATC facilities and remote communication sites, control the operation of remotely located ground to air Very High Frequency/Ultra High Frequency (VHF/UHF) radios used by air traffic controllers to communicate with pilots. RCE interfaces with the voice switch at the ATC facility, telephone landlines, and ground to air radios at the En Route Remote Communications Air/Ground (RCAG) sites, Terminal Remote Transmitter/Receiver (RTR) sites, and Flight Service Station Remote Communications Outlet (RCO) sites.

Satellite Communication Airborne Radios

The Satellite Communication (SATCOM) airborne radios are transceivers installed in commercial, cargo, and military aircraft transiting in the National Airspace System (NAS) and are used as an alternate means of voice communications between pilots in aircraft and ground controllers. These transceivers are typically used in transoceanic applications.

Satellite Communication Ground Radios

Satellite Communications (SATCOM) Ground Radios are transceivers installed at oceanic and en route facilities to support an alternative means of tactical air traffic control (ATC) voice communications between ground controllers and pilots in aircraft. These transceivers are typically used in transoceanic applications. These transceivers are also installed at regional facilities and used as an alternate means of communications in case of total ground communications failure or between locations in mountainous terrain or where other means of communications are not possible (e.g., Alaska).

Oceanic air to ground satellite communications are provided via a communications service provider. The FAA currently has no plans to develop or implement its own air to ground SATCOM ground radios.

Surveillance Processor (Safe Flight 21)

The Surveillance Processor (Safe Flight 21) is a demonstration system that receives, processes, and distributes surveillance data between Safe Flight 21 (SF-21) architectural elements to support operational trials. The processor receives surveillance data from various sources, including surveillance sensors, Automatic Dependent Surveillance-Broadcast (ADS-B) systems, multilateration systems, Air Traffic Control (ATC) automation systems, and flight plan processing systems. The processor fuses the various surveillance data to create aircraft track data, which is distributed to various SF-21 architectural elements. One of the capabilities supported by the processor is the processing and distribution of Traffic Information Services - Broadcast (TIS-B) information to ADS (SF-21) Ground Stations, for subsequent transmission to aircraft.

Ultra High Frequency Airborne Radios (key system)

The Ultra High Frequency Avionics (UHF Avionics) are analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225-400 MHz frequency band, which are multi-channel transceivers, installed in an airborne military platform. These airborne devices support the tactical two-way voice communications/ coordination between the military pilot in the military aircraft and the controller on the ground.

Ultra High Frequency Ground Radios

Ultra High Frequency (UHF) Ground Radios are analog UHF amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 Mhz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and flight service station domains.

Ultra High Frequency Ground Radios - Replacement (key system)

The Ultra High Frequency Ground Radios - Replacement (UHF Ground Radios - Repl) mechanism represents analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 MHz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and Flight Service Station domains.

Very High Frequency Airborne Radios (key system)

Very High Frequency (VHF) Airborne Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 Mhz frequency band which are multi-channel transceivers installed in an airborne platform (e.g., commercial, cargo, and general aviation aircraft). These airborne devices support the tactical two-way voice communications/coordination between the pilot in the aircraft and the controller on the ground.

Very High Frequency Ground Radios (key system)

Very High Frequency (VHF) Ground Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 MHz frequency band which are single-channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the pilot in commercial, cargo, or general aviation aircraft in the oceanic, en route (i.e., ARTCC), terminal (i.e., TRACON/tower), and flight service station domains. Additionally, there are analog VHF frequency modulation (VHF - FM) radio devices operating in the 161 - 174 MHz frequency band that are multi-channel transceivers. These transceivers are used by flight inspection, aviation security, and airway facility specialists supporting local airport operations and maintenance or to perform their operational maintenance mission in support of the NAS. However, these same VHF-FM transceivers are also used to support the resolution of emergency situations or establish a level of voice command and control communications/coordination during disaster recovery.

Very High Frequency Multi-Mode Airborne Radios (key system)

Very High Frequency Multi-Mode Airborne Radios (VHF MM Airborne Radios) refers to an airborne radio operating in the very high frequency (VHF) range capable of operating in the following modes: (1)) analog voice (i.e., 25 kHz spacing for use in the United States and other similarly equipped countries); (2) VHF Digital Link Mode 2 (VDL Mode-2) (two-way digital data transmission); (3) VHF Digital Link Mode 3 (VDL Mode-3), (integrated two-way digital voice/data transmission); and (4) analog voice (i.e., 8.33 kHz spacing for use in Europe and other similarly equipped countries).

Voice Switching and Control System (key system)

The Voice Switching and Control System (VSCS) is installed in the Air Route Traffic Control Center (ARTCC). The VSCS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The VSCS provides the Air Traffic Control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ARTCC (intercom), interconnectivity between controllers in separate ARTCCs (interphone), and interconnectivity between ARTCC controllers and Terminal Radar Approach Control (TRACON) controllers/Airport Traffic Control Tower (ATCT) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ARTCC controllers and pilots is also supported by the VSCS.

Voice Switching and Control System Modification (Control System Upgrade)

The VSCS control system upgrade (VCSU) is a replacement of the Tandem computers that perform the logical switching and control for the VSCS system. The replacement of Tandem computers is for all ARTCCs including three spares.

Voice Switching and Control System Modification (Technological Refresh) (key system)

The Tech Refresh for VSCS is a service life extension. The Tech Refresh encompasses workstation upgrade, video display monitor, control equipment power, VSCU supportability, control shelf power supply, and software development demonstration system expansion.

Voice Switching and Control System Training and Backup Switches

Voice Switching and Control System Training and Backup Switch (VTABS) was developed to meet AT requirements for a separate standalone VSCS Backup and Training System. VTABS can be configured as a 50-position switch with the capability to support air traffic operations in the event of VSCS failure, hardware and software maintenance or power loss.

People

ARTCC Operational Manager In-charge

The ARTCC Operational Manager In-charge (AOMI) provides overall operational supervision to the Area Supervisors assigned to the shift. The AOMI, briefed by the TMU Supervisor on projected traffic for the shift, maintains situational awareness of traffic activities to ensure adequate staffing and optimal operational efficiency for the shift. The AOMI also logs equipment outages and assesses the impact on air traffic. He/she makes the decision to switch from the Host computer to DARC when necessary. The AOMI is also responsible for investigating immediate alerts for possible operational error or operational deviation, keeps immediate alert log up to date, records the outcome of each alert, and notifies Region and/or Headquarters of any occurrences that may become newsworthy. In addition, the AOMI signs for NOTAMS and ALNOTS and ensures proper dissemination.

Meteorologist

Meteorologists provide accurate and timely weather information for FAA facilities within their area of responsibility. They analyze and interpret real-time weather data from radar, satellites and pilot reports as well as NWS products such as terminal and area forecasts, and in-flight advisories.

Non-Radar Controller

A Non-Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate transfer of control, communications, and flight data; Ensure computer entries are completed on instructions or clearances issued or received; Ensure strip marking is completed on instructions or clearances issued or received.

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Planning Controller

A Planning Controller performs the following activities: Ensure separation; Initiate control instructions; Operate interphones; Conduct air/ground communications via data link; Coordinate tactical traffic flows; Scan flight data; Correlate with situation data; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the tactical controller when aware of those instructions.

Radar Associate Controller

A Radar Associate Controller performs the following activities: Ensure separation, initiate control instructions; operate interphones; Accept and initiate non-automated handoffs; and ensure radar controller is made aware of the actions; Assist the radar controller by accepting or initiating automated handoffs/pointouts which are necessary for the continued smooth operation of the sector, and ensure that the radar controller is made immediately aware of any action taken; Coordinate, including pointouts; Monitor radios when not performing higher priority duties; Scan flight progress strips; Correlate with radar data; Manage flight progress strips; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the radar controller when aware of those instructions.

Radar Controller

A Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate automated handoffs; Assist the radar associate controller with non-automated handoff actions when needed; Assist the radar associate controller in coordination when needed; Scan radar display; Correlate with flight progress strip information; Ensure computer entries are completed on instructions or clearances you issue or receive; Ensure strip marking is completed on instructions or clearances you issue or receive.

Radar Coordinator

A Radar Coordinator performs the following activities: Perform interfacility/ intrafacility/sector/controller coordination of traffic actions; Advise the radar controller and the radar associate controller of sector actions required to accomplish overall objectives; Perform any of the functions of the sector team which will assist in meeting situation objectives.

Supervisory Air Traffic Control Specialist

The supervisor is responsible for overall facility operations during an assigned shift. Duties include ensuring adequate staffing for the operational situation, monitoring operational positions, and ensuring functions are performed in accordance with directives.

Tactical Controller

A Tactical Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios and data link; Oversee data link communications by the associate tactical controller; Accept and initiate automated handoffs; Assist the planning controller with non-automated handoff actions when needed; Assist the planning controller in coordination when needed; Scan the situation display; Correlate with flight data; Ensure computer entries are completed on instructions or clearances you issue or receive.

Traffic Management Coordinators

Traffic Management Coordinators track and predict traffic flows, analyze ground delays, evaluate alternative routing strategies, and plan local traffic patterns at the local facility (ARTCC, TRACON, or Towers)

Traffic Management Specialist

Traffic Management Specialists perform the following activities: Balance air traffic demand with the airspace's capacity to maintain maximum and efficient utilization of the NAS; Coordinate and implement traffic management directives if needed for area of responsibility; Monitor and balance traffic flows within the area of responsibility in accordance with traffic management directives; Evaluate effectiveness of traffic management directives and make necessary adjustments; Document delay information.

Interfaces

Air Route Surveillance Radar - Model 1E — (Surveillance Data) ➔ Air Traffic Control Beacon Interrogator - Model 6

The ATCBI-6 correlates return signals from the primary radar with beacon signals and transmits the data to the automation system.

Air Route Surveillance Radar - Model 2 — (Surveillance Data) ➔ Air Traffic Control Beacon Interrogator - Model 6

The ATCBI-6 correlates return signals from the primary radar with beacon signals and transmits the data to the automation system.

Air Route Surveillance Radar - Model 3 — (Surveillance Data) ➔ Air Traffic Control Beacon Interrogator - Model 6

The ATCBI-6 correlates return signals from the primary radar with the beacon signals and transmits the data to the automation system for tracking and display.

Air Route Surveillance Radar - Model 3 — (Surveillance Data) ➔ Microprocessor-En Route Automated Radar Tracking System

The ARSR-3 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the Micro-EARTS for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 4 — (Surveillance Data) ➔ Air Traffic Control Beacon Interrogator - Model 6

The ATCBI-6 correlates return signals from the primary radar with the beacon signals and transmits the data to the automation system for tracking and display.

Air Route Surveillance Radar - Model 4 — (Surveillance Data) ➔ Microprocessor-En Route Automated Radar Tracking System

The ARSR-4 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the Micro-EARTS for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 4 — (Weather Data) ➔ Microprocessor-En Route Automated Radar Tracking System

The ARSR-4 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the Micro-EARTS for processing and use in controlling air traffic in the en route domain.

Air Traffic Control Beacon Interrogator - Model 4 — (Surveillance Data) ➔ Air Route Surveillance Radar - Model 1E

The ARSR-1 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports via a CD-2, which sends the data to an automation system for tracking and display.

Air Traffic Control Beacon Interrogator - Model 4 — (Surveillance Data) ➔ Air Route Surveillance Radar - Model 2

The ARSR-2 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports via a CD-2, which sends the data to an automation system for tracking and display.

Air Traffic Control Beacon Interrogator - Model 4 — (Surveillance Data) ➔ Microprocessor-En Route Automated Radar Tracking System

The ATCBI-4 sends aircraft identification, position, and altitude to the Micro-EARTS for processing and use in controlling air traffic in the terminal domain from a CERAP.

Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) ➔ Air Route Surveillance Radar - Model 1E

The ARSR-1 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports via a

CD-2, which sends the data to an automation system for tracking and display.

Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) → Air Route Surveillance Radar - Model 2

The ARSR-2 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports via a CD-2, which sends the data to an automation system for tracking and display.

Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) → Air Route Surveillance Radar - Model 3

The ARSR-3 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports and then sends the data to an automation system for tracking and display.

Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) → Air Route Surveillance Radar - Model 4

The ARSR-4 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports and then sends the data to an automation system for tracking and display.

Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) → Microprocessor-En Route Automated Radar Tracking System

The ATCBI-4 sends aircraft identification, position, and altitude to the Micro-EARTS for processing and use in controlling air traffic in the en route domain, as well as in terminal domains associated with CERAPs.

Multi-Mode Digital Radios ← (Voice Communication) → Radio Control Equipment

Multi-Mode Digital Radios ← (Voice Communication) → Very High Frequency Airborne Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Multi-Mode Digital Radios ← (Voice Communication) → Very High Frequency Multi-Mode Airborne Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Radio Control Equipment ← (Data Communication) → Radio Control Equipment

Radio Control Equipment ← (Voice Communication) → Voice Switching and Control System

Radio Control Equipment ← (Voice Communication) → Voice Switching and Control System Modification (Technological Refresh)

Ultra High Frequency Ground Radios - Replacement ← (Voice Communication) → Ultra High Frequency Airborne Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Very High Frequency Ground Radios ← (Voice Communication) → Very High Frequency Airborne Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Very High Frequency Ground Radios ← (Voice Communication) → Very High Frequency Multi-Mode Airborne Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Voice Switching and Control System — (Voice Communication) → Digital Voice Recorder System

This interface records and temporarily archives voice transmissions.

Voice Switching and Control System ← (Voice Communication) → Multi-Mode Digital Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Voice Switching and Control System ← (Voice Communication) → Ultra High Frequency Ground Radios - Replacement

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Voice Switching and Control System ← (Voice Communication) → Very High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Voice Switching and Control System ← (Voice Communication) → Voice Switching and Control System

This interface enables ATC voice communication between controllers in same or different facilities.

Voice Switching and Control System ← (Voice Communication) → Voice Switching and Control System Modification (Technological Refresh)

This interface enables ATC voice communication between controllers in different facilities.

Voice Switching and Control System Modification (Technological Refresh) — (Voice Communication) → Digital Voice Recorder System

This interface records and temporarily archives voice transmissions.

Voice Switching and Control System Modification (Technological Refresh) ← (Voice Communication) → Multi-Mode Digital Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Voice Switching and Control System Modification (Technological Refresh) ← (Voice Communication) → Ultra High Frequency Ground Radios - Replacement

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Voice Switching and Control System Modification (Technological Refresh) ← (Voice Communication) → Very High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Voice Switching and Control System Modification (Technological Refresh) ← (Voice Communication) → Voice Switching and Control System Modification (Technological Refresh)

This interface enables ATC voice communication between controllers in same or different facilities.

Issues

none identified

Service Group Air Traffic Services

Service ATC-Separation Assurance

Capability Aircraft to Aircraft Separation Capability

Operational Improvement

Current Oceanic Separation (102105)

Aircraft to aircraft separation services in oceanic airspace ensure a safe distance is maintained between aircraft. Separation minima are based on the oceanic separation and procedures of the International Civil Aviation Organization. These services are supported by a system providing flight data processing, conflict probe, and situation display for oceanic air traffic control. Separation is supported through daily development and publishing of ocean track systems. Assignment to tracks, entry times, etc., through clearance planning, provides separation along and between tracks.

01-Jul-2004 to 30-Dec-2007

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

The FAA provides oceanic air traffic services to aircraft flying within specific flight information regions (FIRs). These regions include a portion of the western half of the North Atlantic Ocean, much of the Caribbean region, a large portion of the Arctic Ocean, and a major portion of the Pacific Ocean. The oceanic domain consists of oceanic air route traffic control centers (ARTCCs) and offshore sites. The New York and Oakland oceanic centers are responsible for oceanic airspace, while the Anchorage ARTCC provides en route (including radar coverage) and oceanic air traffic services for all Alaskan airspace. The current oceanic aircraft-to-aircraft separation service uses a combination of flight strip-intensive manual air traffic controller procedures, limited automation aids, complex procedural separation rules, airspace design, and communications to ensure safe separation over an enormous area where independent surveillance is not feasible. Oceanic airspace includes some "exclusionary" airspace, where the available oceanic Air Traffic Management services depend on aircraft equipment.

Aircraft communications range from high frequency (HF), very high frequency, and ultra high frequency radios to satellite-based data links. ARTCCs located in New York, Oakland, and Anchorage Federal Aviation Administration (FAA)- oceanic separation provide assurance services. Although co-located with en route facilities, and sharing some common elements, oceanic and en route operations differ significantly in many respects. Operations between the three FAA oceanic facilities also differ significantly due to differences in geography, traffic flows, controller tools, and technical and physical interfaces.

The primary difference between oceanic and en route separation assurance services is lack of independent surveillance and lack direct pilot/controller communications capability in oceanic sectors. This lack of capabilities is caused by line-of-sight constraints that prevent radar surveillance and normal VHF or UHF voice radio communications. Voice communications between oceanic sector controllers and pilots are relayed through a third-party commercial communications service provider using HF radio frequencies, which are noise-prone and subject to atmospheric interference. If the aircraft has satellite-voice telephone capability, a direct pilot-to-controller voice link can be used. The high cost of this type of service generally limits its use to emergency situations. The communications service provider also provides an HF voice patch to enable direct pilot-controller voice communications, but this service is also generally reserved for emergency situations due to time and cost considerations.

Oceanic separation assurance is primarily procedural, based on position reports, relatively large separation minima, procedural separation rules, airspace structure, and avionics performance capabilities. Position reporting often depends on the crew's determination of aircraft position using such onboard equipment as inertial navigation systems or inertial reference units, and global positioning system receivers. Procedural separation in the oceanic environment is much more strategic than the tactical radar-based separation provided in the en route and terminal environments. The primary controller tools for providing separation assurance are paper flight strips, the airspace and oceanic track design, and the controller's knowledge of procedural separation rules. In the New York and Oakland centers, the Oceanic Display and Planning System (ODAPS)provides a situation display of controlled aircraft estimated positions in oceanic airspace. These positions are based on the extrapolation of filed flight plan data and are updated by periodic HF voice position reports, position reports via Oceanic Data Link from Future Air Navigation System (FANS) 1/A-equipped aircraft, or controller input. The ODAPS also supports a procedural conflict probe capability. Controllers use the ODAPS interim situation display (ISD) for planning and situational awareness. The ISD does not provide the controller decision support tools and thus is not used as the primary means for procedural separation.

The Advanced Technologies and Oceanic Procedures (ATOP) is a new system installed at the Oakland and New York oceanic facilities. ATOP has a situation display presentation, similar to those used in en route Air Traffic Control (ATC) operations. ATOP provides surveillance data processing capable of processing primary and secondary radar, and Automatic Dependent Surveillance - Addressable and Automatic Dependent Surveillance - Broadcast. The oceanic situation displays are not certified for separation and are used for planning and situational awareness only. A fully integrated flight data-processing capability combined with the surveillance data provide the controller with improved trajectory information.

Oceanic separation assurance is usually provided in three dimensions relative to the aircraft trajectory: vertical, lateral, and longitudinal separation. This is generally for aircraft using instrument flying rules assigned to an oceanic organized track system, which applies to most aircraft crossing oceanic airspace. Current oceanic separation minima are typically 2,000 feet vertically, 120 nautical miles (NM) laterally, and 10 minutes longitudinally, which corresponds to 80-100 NM in-trail separation. In a formal Oceanic Organized Track Structure area, the track structure provides the vertical and lateral separation assuming that there is a level flight along the assigned track.

The organized track system makes the most efficient use of heavily traveled oceanic airspace. An oceanic organized track system can be thought of as a three-dimensional stack of mostly parallel or diverging lines, tracing the assigned route along a heavily traveled path between city pairs. Each stack of parallel lines is an oceanic track defined as a series of fixes. The altitude levels within a track are generally separated by the legal vertical separation minima in effect for that airspace. The oceanic track systems are composed of either fixed tracks or flex tracks. The fixed tracks are published and infrequently modified. The flex tracks vary according to the forecast winds and are the most fuel- and time-efficient paths, and are generally separated by the legal lateral separation minima in effect for that airspace. Generally, flex tracks are generated every 12-24 hours to support outbound traffic grouped around the times when most users wish to depart. The flex tracks are plotted to follow the most efficient combination of shortest distances and most favorable winds while avoiding potentially hazardous weather and active special use airspace.

The random track is an oceanic track that is a series of fixes not corresponding to an organized track system. The random track is used as a part of the flight plan, usually in an area where there is less traffic, or by an aircraft unable to meet the equipment requirements in exclusionary airspace. Exclusionary airspace is a volume of controlled airspace that normally excludes aircraft that do not meet specific published equipment and performance requirements. Regardless of type, the oceanic track is structured to provide legal separation for traffic needing separation assurance services. Defining the allowed altitudes of each track and assigning aircraft to those flight levels achieve vertical separation.

The fixes defining an oceanic route or track are generally latitude/longitude coordinates because oceanic airspace is beyond the range of ground-based navigation aids. When plotting oceanic tracks to ensure legal lateral separation, the controller also uses the latitude/longitude grid on his route chart. Lines of latitude are parallel, and 60 NM separates each degree of latitude. If a track is heading due east (or west) along a line of latitude, a parallel track along a line of latitude 2 degrees north or south will be separated by 120 NM. Because most tracks or track segments are not precisely due East (or West), tracks are often routed to the closest intersection of a line of latitude and a line of longitude nearest the desired path, north or south of the latitude of the current fix. The controller applies procedural separation rules when plotting adjacent tracks on a latitude/longitude grid to account for the fact that lines of longitude are not precisely parallel and converge from a 60 NM separation standard at the equator to zero at the poles. Lateral separation reduction to 50 NM is currently deployed in selected routes of the Pacific.

In Reduced Vertical Separation Minima (RVSM) airspace, the legal vertical separation minimum is 1,000 feet. RVSM has been implemented in the North Atlantic and much of the Pacific for selected flight levels. To operate in RVSM airspace, an aircraft must be equipped with redundant altitude measurement systems that meet RVSM criteria, an altitude reporting transponder, an altitude alert system, and an automatic altitude control system. RVSM enables increased airspace capacity for the airspace in which it is applied.

Required Navigation Performance (RNP) is a key requirement for reduced horizontal separation minima (RHSM). RNP measures the aircraft navigation system's statistical ability to maintain horizontal track accuracy. In implementing 50 NM lateral separation minima reduction in selected Pacific areas, aircraft are required to be RNP-equipped and have cumulative horizontal navigation errors, if applicable, that do not exceed 10 NM 95 percent of the time for entire flight. In areas with a threat of severe convective weather conditions, direct controller-to-pilot voice or data communication may be required to facilitate Air Traffic Control coordination should the need arise for a weather deviation clearance. This is in addition to HF voice radio communications capability, which is indirect and uses a third-party radio operator link. The direct controller-to-pilot communication requirement is currently satisfied in the Oakland and New York FIRs by the Multi-Sector Oceanic Data Link capability for FANS-equipped aircraft.

The crew is responsible for keeping the aircraft in compliance with the ATC-cleared flight plan because oceanic airspace is outside of radar and direct controller-to-pilot communications range. The crew must follow a well-defined procedure involving checking and rechecking route data input into the Flight Management System. In the event of equipment failure, navigation error, or the crew's inability to keep the ATC clearance, the crew and ATC separation service providers can follow published procedures. The crew must normally obtain approval from ATC before deviating from the clearance. In an emergency or a weather diversion when communications limitations prevent ATC contact, the procedure is structured to minimize the likelihood of conflict with other traffic. When a weather diversion is necessary and the crew is unable to obtain ATC approval, it will normally divert laterally up to half the width of the lateral track separation minima and climb or descend to an altitude half way between the flight levels assigned to the track. When a pilot undertakes a maneuver without obtaining clearance from the controller, the responsibility for providing separation shifts from the controller to the pilot until the pilot notifies ATC that the aircraft is back on the cleared track and flight level.

Benefits

Current operations are provided in the NAS.

Systems

Advanced Technologies and Oceanic Procedures (key system)

Advanced Technologies and Oceanic Procedures (ATOP) is a Non-Developmental Item (NDI) automation, communications, training, maintenance, installation, transition, and procedures development support acquisition. It will provide a Flight Data Processing (FDP) capability fully integrated with Surveillance Data Processing (SDP). The SDP will be capable of processing primary and secondary radar, Automatic Dependent Surveillance (ADS, both Addressable: ADS-A and Broadcast: ADS-B), Controller Pilot Data Link Communications (CPDLC) position reports, and relayed High Frequency (HF) radio voice pilot position reports from an HF radio operator employed by a communications service provider under contract to the FAA. ATOP will support radar and non-radar procedural separation, tracking clearances issued via CPDLC or messages through the HF radio service provider, conflict detection/prediction capabilities through the use of controller tools (Conflict Alert and Minimum Safe Altitude Warning for radar airspace and Conflict Probe for non-radar procedural separation applications), and fully automated coordination via Air traffic services Inter-facility Data Communications System (AIDCS) with AIDCS equipped adjacent Flight Information Regions (FIRs) . The ATOP inter-facility data communications system will be capable of supporting the ICAO air traffic services message set. ATOP supports operations in which the information and primary capabilities required for the controller to maintain situational awareness and provide procedural separation services are available on the display (rather than paper flight strips).

Advanced Technologies and Oceanic Procedures Controller Work Station (key system)

The Advanced Technologies and Oceanic Procedures Controller Work Station (ATOP Controller WS). The ATOP Controller Workstation is part of a non-developmental item (NDI) automation, training, maintenance, installation, transition, and procedures development support acquisition. The workstation will interface with the integrated Flight Data Processing (FDP). The workstation will contain displays for information from primary and secondary radar, Automatic Dependent Surveillance (ADS), Controller Pilot Data Link Communications (CPDLC) position reports, and relayed pilot reports from High Frequency (HF) voice service provider. The ATOP workstation will support radar and non-radar procedural separation, tracking clearances issued via CPDLC or messages through the HF radio service provider, conflict detection/prediction capabilities through the use of controller tools, and coordination via Air Traffic Services Interfacility Data Communications System (AIDCS). Additionally, it is expected to support operations in which the information and primary capabilities required for the controller to maintain situational awareness and provide procedural separation services are available on the display (rather than paper flight strips).

Air Route Surveillance Radar - Model 1E (key system)

The Air Route Surveillance Radar - Model 1E (ARSR-1E) is a 1970s analog radar. It is a long-range radar system with a maximum detection range of 200 nm. The ARSR-1E is a surveillance system used to detect azimuth and slant range of en route aircraft operating between terminal areas. It also provides weather intensity data.

Air Route Surveillance Radar - Model 2 (key system)

The Air Route Surveillance Radar - Model 2 (ARSR-2) is a 1970s analog radar. It is a long-range radar system with a maximum detection range of 200 nm. The ARSR-2 is a surveillance system used to detect azimuth and slant range of en route aircraft operating between terminal areas. It also provides weather intensity data.

Air Route Surveillance Radar - Model 3 (key system)

The Air Route Surveillance Radar - Model 3 (ARSR-3) is a 1980s radar that provides primary long range surveillance data, including slant range and azimuth data. It processes the returns which includes demodulation, analog-to-digital conversion, moving target indicator function, sensitivity time control, range and azimuth gating, and digital target extraction - all of which are performed digitally (with the exception of the demodulation and analog-to-digital conversion). In addition, the ARSR-3 has a weather channel with associated processing to provide weather contour information in digital format.

Air Route Surveillance Radar - Model 4 (key system)

The Air Route Surveillance Radar - Model 4 (ARSR-4) is a three-dimensional, long-range, rotating phased array, primary surveillance radar with integrated height finder capability. It is part of the joint surveillance system (JSS) used in conjunction with ARSR-3 coverage as part of the nationwide air defense command surveillance network. In addition to functions peculiar to the military, the ARSR-4 performs the same basic functions of the ARSR-3, by providing primary long-range surveillance data, including slant range and azimuth data.

Air Traffic Control Beacon Interrogator - Model 6 (key system)

The Air Traffic Control Beacon Interrogator Model 6 (ATCBI-6) is a ground-based system that interrogates transponders, receives and processes replies from transponders, determines the range and azimuth to the aircraft, and forwards the information to appropriate air traffic control (ATC) automation systems. Replies provide identification and altitude data of the transponder.

Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program)

The Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) (ASR-9/Mode S (SLEP)) mechanism provide the necessary technical refresh to extend the service life of the ASR-9 and Mode S through 2030. The ASTERIX upgrade has not been implemented, but will be implemented at a later date.

Automatic Dependent Surveillance - Addressable Avionics

Automatic Dependent Surveillance - Addressable Avionics (ADS-A Avionics) are devices that upon reception of messages specifically addressed to the aircraft, compose and transmit a message specifically addressed to the interrogator, containing the current position of the aircraft as determined by on-board navigation equipment, the aircraft identification, and the short term planned course changes. A specific form of ADS, designed to support oceanic aeronautical operations, based on one-to-one communications between aircraft providing ADS information and a ground facility requiring receipt of ADS reports.

Automatic Dependent Surveillance - Broadcast (Capstone) Avionics

Automatic Dependent Surveillance - Broadcast (Capstone) Avionics (ADS-B (Cap) Avionics) are the surveillance avionics used by the Capstone project under Safe Flight 21. These are demonstration avionics that are used to support ADS-B-related operational trials in Alaska.

Digital Voice Recorder System (key system)

Provides modern digital voice recording devices used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

In Feburary 2004, the DVRS was upgraded with a 24-channel card, which replaced the 16-channel card. This minor upgrade, called DVR II, was not extended to the systems installed prior to February 2004.

Digital Voice Recorder System Replacement

The Digital Voice Recorder System Replacement (DVRS Replacement) is a modern digital system used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

Direct Access Radar Channel

The Direct Access Radar Channel (DARC) provides a back-up processing path to provide surveillance data to the displays in the event of a primary channel (Host Computer System (HCS) failure. The DARC path is a physically, logically and electrically separate processing path (with diverse hardware and software) from the primary Host Computer System (HCS) Radar Data Processing (RDP) paths. Thus DARC provides a tertiary path, to keep radar data on the controller''s displays, should both HCS RDP paths be disabled for any reason. The DARC provides radar data processing, very limited flight data processing, but with significantly less functionality than the HCS. Basically, DARC serves as a lifeboat should both HCS processing paths become disabled.

Dynamic Ocean Track System

Provides, as part of the oceanic traffic planning system (OTPS), track generation and traffic display.

Update: You may see the term DOTS still being used for the ocean tracking system. This system is now upgraded/ incorporated into the DOTS Plus. See that mechanism description for more current information.

Dynamic Ocean Tracking System Plus (key system)

The Dynamic Ocean Tracking System Plus (DOTS Plus) automation system is located in each of the three Oceanic ARTCCs (Anchorage, Oakland, and New York) and in the ATCSCC. DOTS permits airlines to save fuel by flying random routes, in contrast to structured routes, and permit the air traffic controller to achieve lateral spacing requirements more efficiently. DOTS generates flexible oceanic tracks that are optimized for best airspace utilization and best time/fuel efficiency. Flexible tracks are updated twice a day using forecast winds aloft and separation (vertical and lateral) requirements. The DOTS oceanic traffic display gives a visual presentation of tracks and weather. DOTS sends traffic advisories and track advisories to users and receives aircraft progress reports from the commercial communications service providers. These external data exchanges are achieved through interfaces with the National Airspace Data Interchange Network (NADIN) Packet Switch Network (PSN) for Position Reports, Air Traffic Management (ATM) messages, Pilot Reports (PIREPS), and the Anchorage FDP2000. An interface to the Enhanced Traffic Flow Management System (ETMS) will improve coordination between the oceanic and domestic Traffic Flow Management (TFM) systems/activities. The DOTS Weather Server, installed at the Air Traffic Control System Command Center (ATCSCC), receives National Weather Service (NWS) wind and temperature data via the WARP/WINS system. The weather data is then distributed to the ARTCCs via commercially provided Integrated Services Digital Network (ISDN) telephone lines. DOTS Plus supports separation reduction initiatives as stipulated in RNP-10 (Required Navigation Performance) for decreasing lateral separation from 100 nautical miles to 50 nautical miles.

Emergency Voice Communications System (key system)

The Emergency Voice Communications System (EVCS) is located at Headquarters (HQ), Regional Offices, several Air Route Traffic Control Centers (ARTCCs), Terminal Radar Approach Control (TRACON) facilities, and other selected sites. EVCS uses two (2) dedicated Federal Telecommunications Service 2001 (FTS2001) dial access channels at most FAA locations. Dedicated dial lines using the Public Switched Telephone Network (PSTN) are used at locations not having direct access to FTS2001. Supports HQ and Regional Communications Command Centers'' functions for accident and incident reports, hijacks, aircraft crashes, aviation security matters, military activities, natural disasters, etc.

Enhanced Back-up Surveillance

The Enhanced Back-Up Surveillance (EBUS) system replaces the DARC system in use at the 20 Air Route Traffic Control Centers (ARTCC) in the contiguous United States (CONUS), the William J. Hughes Technical Center (WJHTC), and the FAA Academy (FAAAC). The EBUS design employs the existing FAA-certified software of the Microprocessor En Route Automated Radar Tracking System (Micro-EARTS) application to provide radar data processing (RDP) services for the replacement legacy backup system. Micro-EARTS provides key capabilities not supported by the DARC legacy system it replaces, among which are the safety functions of Conflict Alert (CA), Mode-C Intruder (MCI), and Minimum Safe Altitude Warning (MSAW). EBUS also provides Next Generation Radar (NEXRAD) weather data to R-position users via the DSR Backup Communications Network (BCN). EBUS makes the R-position functionality on the backup channel more comparable to that of the primary channel.

The EBUS software (Micro EARTS) and the ECG backup gateway software will share the same hardware platform such that both software functions will reside in the same ECG backup gateway hardware platform.

Fixed Position Surveillance - Model 117

The Fixed Position Surveillance - Model 117 (FPS-117) radar is a joint-use military surveillance system used by the FAA to detect slant range and azimuth of en route aircraft. These radars are located in Alaska (12) and Hawaii (1), and are expected to be sustained until at least 2020.

Fixed Position Surveillance Model 20 Series

The Fixed Position Surveillance Model 20 Series (FPS-20 Series) is a military primary radar of various models (FPS-20A, FPS-64, FPS-66A, FPS-67/A/B, and ARSR-60M) used by the FAA to detect slant range and azimuth of en route aircraft operating between terminals in the continental United States. Each of the different radar models is a similar variation of the original FPS-20 military radar.

Flight Data Input/Output

The Flight Data Input/Output (FDIO) system provides flight progress information for use by the Tower, Terminal Radar Approach Control (TRACON) and Air Route Traffic Control Center (ARTCC) controllers. The FDIO system allows Air Traffic Control (ATC) Specialists to input automated flight data, perform data manipulation, and print flight strips.

Flight Management System

Flight Management System (FMS) is a computer system that uses a large database to allow routes to be preprogrammed and stored. The system is constantly updated with respect to position accuracy by reference to one or more conventional radio navigation aids (i.e., multi-sensor systems). The system may also use information from an inertial reference unit (IRU) or from a stand-alone inertial navigation system (INS). A sophisticated program and its associated database ensure that the most appropriate navaids are automatically selected during the update cycle. FMSs combine the relative position information from two or more point-referenced navigation aids such as VOR or DME to determine the absolute position of the aircraft (latitude, longitude). The resulting Area Navigation (RNAV) capability permits operation on any desired course.

Future Air Navigation System 1/A (key system)

The Future Air Navigation System (FANS) is based on the International Civil Aviation Organization□s (ICAO) concept of a phased approach to implementing a modern, satellite-based, global Communication, Navigation, Surveillance/ Air Traffic Management (CNS/ATM) system. The following aircraft avionics are required to support an initial FANS implementation. These functions are referred to as FANS-1; the French developed equivalent for the Airbus A-330/340 is called FANS-A: Automatic Dependent Surveillance (ADS), ATC Data link, Airline Operational Control Data Link, Global Positioning System (GPS.

The FANS operational environment extends beyond the aircraft to include satellite, ground-based receiver/transmit stations, and a controller/pilot datalink system.

FANS 1/A consists of three message applications: AFN (ATS Facility Notification for logon to ATC via data link), ADS (Automatic Dependent Surveillance), CPDLC (Controller Pilot Data Link Communications). FANS 1/A uses the existing ACARS air/ground network to carry data link messages to/from the aircraft.

FANS 1 (Boeing implementation) was first certified in June of 1995 for use in the South Pacific. Oakland, Fiji, Aukland, and Brisbane FIRs were the initial participants for CPDLC using Inmarsat satcom. The latter three FIRs also used ADS for surveillance.

"The OEP identifies the ATOP program for implementation of FANS 1/A in Oakland, Anchorage and NY FIRs beginning in 2003." There are approximately 1000 FANS 1/A equipped aircraft in service as of mid-2002. All long-range model commercial transport aircraft have FANS 1 or FANS A either as standard equipment or as an option. In oceanic and remote areas, where FANS 1/A is currently in use, the Inmarsat geosynchronous satellite constellation provides the air/ground data link. HF data link will undergo trials as a FANS 1/A air/ground data link in late 2002-2003.

Global Positioning System

The Global Positioning System (GPS) is a worldwide, all-weather, satellite-based navigation system developed, maintained & operated by the U.S Department of Defense, and managed by an Interagency executive board. GPS is a (nominal) 24 satellite constellation orbiting at approximately 12,000 miles above the earth in six planes. Each satellite broadcasts a precisely timed L-band signal on the same frequency. User GPS receivers, oboard aircraft, in ground vehicles or hand-held, receive and process the signals from all satellites in view, with a minimum of four satellites necessary to determine the receiver''s three-dimensional position (i.e., latitude, longitude and altitude), velocity (if applicable) and the precise time of day. GPS equipped aircraft can navigate on published jetways or utilize Area Navigation (RNAV) to fly any desired course between two locations.

GPS avionics built to TSO C-129 support en route and terminal area navigation, as well as non-precision instrument approach operations. Approval has been granted for properly certified GPS avionics to be used as a primary means of navigation in oceanic airspace and in certain remote areas. In July 2003 the Wide Area Augmentation System (WAAS)was commissioned to augment the GPS signal to meet primary navigation service requirements for accuracy, coverage, availability, and integrity.

Global Positioning System Avionics

Global Positioning System (GPS) Avionics process the signals received from four or more GPS satellites and determine the three-dimensional position (i.e., latitude, longitude and altitude) and velocity of an aircraft, as well as the precise time of day. GPS avionics provide an Area Navigation (RNAV) capability that permits operation on any desired course.

GPS avionics built to TSO-C129 do not have augmentation (WAAS, LAAS) and are approved only as a supplemental navigation system in the NAS, meaning that they must be used in conjunction with a primary navigation system. TSO-C129 avionics support en route and terminal area navigation, as well as non-precision instrument approach operations. Approval has been granted for properly certified GPS avionics to be used as a primary means of navigation in oceanic airspace and in certain remote areas. In certain regions of the world (including the NAS), GPS will be augmented (Wide Area and Local Area systems) to satisfy additional requirements for accuracy, coverage, availability, and integrity. Augmented GPS avionics (WAAS, LAAS) are expected to support precision instrument approach operations, and to gain approval as a primary navigation system throughout the NAS. It is anticipated that users will migrate from TSO-C129 avionics to augmented GPS avionics (WAAS, LAAS).

Heating, Ventilation and Air Conditioning - Long-Range Radar (key system)

The Heating, Ventilation and Air Conditioning - Long-Range Radar (HVAC - LRR) mechanism provides the systems to maintain the temperature and relative humidity within the facility at acceptable levels for LRR system operation or personnel comfort as required. This includes filtering of air to Occupational Safety and Health Administration (OSHA) requirements.

High Frequency Airborne Radios (key system)

High Frequency (HF) Airborne Radios are analog (HF multi-channel radio transceivers operating in the 2 - 30 Mhz frequency band installed in airborne commercial, cargo, and military aircraft transiting the oceanic, en route, terminal, or flight service station airspace domains. These transceivers are typically used in transoceanic applications.

High Frequency Ground Radios (key system)

High Frequency (HF) Ground Radios are analog HF radio devices operating in the 2 - 30 Mhz frequency band, which may be single channel transmitters and receivers or multi-channel transceivers. These radio devices are installed at oceanic and en route facilities and used to support tactical air traffic control (ATC) voice communications between a ground controller and a pilot in an aircraft in the oceanic domain. Additionally, these devices are also installed at regional facilities and used to support voice command and control communications /coordination in emergency or during disaster recovery situations occurring in the NAS.

Host Computer System

The Host Computer System (HCS) receives and processes surveillance reports, and flight plan information. The HCS sends search/beacon target, track and flight data, surveillance and alphanumeric weather information, time data, traffic management advisories and lists to the (Display System Replacement) DSR. The HCS associates surveillance-derived tracking information with flight-planning information. The DSR sends requests for flight data, flight data updates, and track control messages to the HCS. HCS-generated display orders are translated for use within the DSR workstation. While radar data processing is distributed among the terminal and En Route computer resources, the HCS performs virtually all of the flight data processing for its entire geographical area of responsibility. Every tower (ATCT) and terminal radar approach control (TRACON) relies exclusively on its parent HCS for flight data.

The HCS also runs algorithms that perform aircraft to aircraft (conflict alert) and aircraft to terrain (Minimum Safe Altitude Warning) separation assurance. The HCS algorithms provide visual and audible alerting to the controller when conflicts are identified.

The HCS presently supplies real time surveillance, flight data and other information to several decision support tools housed in collocated outboard processors connected via two-way high bandwidth links to the HCS and DSR. These are the (User Request Evaluation Tool, (URET), and the Traffic Management Advisory (TMA. URET performs probing of tentative flight plan changes to determine their viability. TMA provides sequencing and spacing information to align the aircraft in En Route airspace for approach.

Host Computer System / Oceanic Computer System Replacement (key system)

The Host Computer System & Oceanic Computer System Replacement (HCS/OCSR--HOCSR) was implemented because of potential Y2K hardware issues with previous hardware. Accordingly, HCS/OCSR provided a new hardware platform, new peripherals (printers and Keyboard Display Video Terminals--KVDT), a new Direct Access Storage Device (DASD), and new OS-370 software extensions to control the new hardware using legacy NAS software applications. Hardware was replaced in both the En Route and Anchorage Oceanic automation environments. HCS/OCSR did not modify the legacy software functions of either the HCS system (e.g., flight data processing, radar data processing) or the Ocean Display and Planning System (ODAPS) automation systems (e.g., filght data processing). Likewise, HCS/OCSR did not impact HID NAS LAN, URET, DSR or PAMRI.

Phase 1 and 2 (mainframe and software extension replacements) were completed prior to 2000. Phase 3 (DASD replacement) was completed in 2003. Phase 4 (peripheral replacement) will be completed in 2004. Enhancement planned for 2005 and beyond were cancelled as they are overtaken by ERAM. Each phase has its own waterfall, and consequently no waterfall can be provided in the Location section below.

Leased Inter-facility National Airspace System Communication System

The Leased Inter-facility National Airspace System Communication System (LINCS) provides transmission channels of various industry-standard types between any specified end points, used to satisfy all FAA operational and some administrative telecommunication requirements.

Low-Density Radio Communications Link (key system)

The Low-Density Radio Communications Link (LDRCL) is an FAA owned Low-Density Radio Communications Link (LDRCL) satisfies short-haul, low-density communication requirements. It provides user access (via tail circuits) to a Radio Communications Link (RCL) site or connectivity between two operational facilities

Microprocessor-En Route Automated Radar Tracking System (key system)

The Microprocessor-En Route Automated Radar Tracking System (Micro-EARTS) is a radar processing system implemented with Commercial Off-the-Shelf (COTS) equipment, for use in both En Route and Terminal environments. It provides single sensor and a mosaic display of traffic and weather using long- and short-range radars. At Anchorage, Alaska, Micro-EARTS also provides Automatic Dependent Surveillance-Broadcast (ADS-B) surveillance and display. Micro-EARTS interfaces with multiple types of displays, including Display System Replacement (DSR), Digital Bright Radar Indicator Tower Equipment (DBRITE), and the flat panel tower controller displays.

Multi-Mode Digital Radios (key system)

Multi-Mode Digital Radios (MDRs) are ground-based Very High Frequency (VHF) air-traffic-control radios that can operate in several configurations: 1) analog voice with 25kHz channel spacing; 2) analog voice with 8.33 kHz channel spacing; and 3) VHF Data Link (VDL) Mode-3 which consists of two-way digital voice and data communication.

Multi-Sector Oceanic Data Link (key system)

Multi-sector Oceanic Data Link System (MSODL) supports air-ground data link communications and extends single sector data link functionality to all Oceanic Display and Planning System (ODAPS) sector positions. Oceanic Data Link (ODL) gives controllers two-way electronic communications with aircraft equipped with data link. The technology is designed to reduce/eliminate the need for voice communication thus improving the reliability and timeliness of message delivery. The ODL provides a means to automatically check pending clearances for conflicts, while enabling flight crews automatically to load flight clearances into the Flight Management System (FMS). The ODL also gives controllers an integrated interface with the flight data processor (FDP). It also addresses problems with the existing high-frequency (HF) communications with aircraft, such as frequency congestion, transcription errors and lack of timeliness.

Oceanic Display and Planning System (key system)

The Oceanic Display and Planning System (ODAPS) consists of equipment that monitors and tracks aircraft over the ocean. It communicates and displays position data and flight plan information to the air traffic controllers responsible for monitoring and routing air traffic in the U.S. oceanic airspace. ODAPS has a situation display of aircraft position based on extrapolation of periodic voice position reports and filed flight plans. ODAPS includes a conflict probe (CP) functionality, which provides advance notification whenever stored flight plan information indicates that loss of separation minima may occur between aircraft, airspace reservations or warning areas.

Oceanic Flight Data Processing System (key system)

The Oceanic Flight Data Processing System (OFDPS) is Honolulu''s unique flight data processing system. It uses modified Oceanic Display and Planning System (ODAPS) software to provide limited flight data processing including providing paper flight strips for the Micro-EARTS system at the Honolulu Center Radar Approach Control (CERAP). Like ODAPS, OFDPS was rehosted on to new hardware using the existing OFDPS application software as part of the En Route Host/Oceanic Computer System Replacement (HOCSR) program. The OFDPS functionality will be replaced with STARS Preplanned Product Improvement (P3I) functionality.

Peripheral Adapter Module Replacement Item

The Peripheral Adapter Module Replacement Item (PAMRI) is an interface peripheral to the HOCSR. It provides a conduit through which the HOCSR receives and exchanges data, primarily radar data, flight data and interfacility data. The PAMRI converts communication protocols and translates data formats so the Host and EDARC can communicate with external devices.

Power System - Long-Range Radar (key system)

The Power System - Long-Range Radar (Pwr Sys - LRR) mechanism provides conditioning of commercial power, including uninterruptible power systems (UPS), to eliminate voltage dropouts, surges, and voltage sags caused by sources outside the facility. Power distribution, grounding, bonding and shielding of electrical system within the facility is also part of the Pwr Sys - LRR.

Radio Communication Link (key system)

Radio Communication Link (RCL) is an integrated voice and data microwave transmission system designed to provide the FAA with cost effective and reliable service for its high capacity NAS communications routes. RCL interconnects air route traffic control center (ARTCC) facilities with long range radar installations and other air traffic control (ATC) facilities.

Radio Control Equipment (key system)

Radio Control Equipment (RCE), located at both ATC facilities and remote communication sites, control the operation of remotely located ground to air Very High Frequency/Ultra High Frequency (VHF/UHF) radios used by air traffic controllers to communicate with pilots. RCE interfaces with the voice switch at the ATC facility, telephone landlines, and ground to air radios at the En Route Remote Communications Air/Ground (RCAG) sites, Terminal Remote Transmitter/Receiver (RTR) sites, and Flight Service Station Remote Communications Outlet (RCO) sites.

Satellite Communication Airborne Radios

The Satellite Communication (SATCOM) airborne radios are transceivers installed in commercial, cargo, and military aircraft transiting in the National Airspace System (NAS) and are used as an alternate means of voice communications between pilots in aircraft and ground controllers. These transceivers are typically used in transoceanic applications.

Surveillance Processor (Safe Flight 21)

The Surveillance Processor (Safe Flight 21) is a demonstration system that receives, processes, and distributes surveillance data between Safe Flight 21 (SF-21) architectural elements to support operational trials. The processor receives surveillance data from various sources, including surveillance sensors, Automatic Dependent Surveillance-Broadcast (ADS-B) systems, multilateration systems, Air Traffic Control (ATC) automation systems, and flight plan processing systems. The processor fuses the various surveillance data to create aircraft track data, which is distributed to various SF-21 architectural elements. One of the capabilities supported by the processor is the processing and distribution of Traffic Information Services - Broadcast (TIS-B) information to ADS (SF-21) Ground Stations, for subsequent transmission to aircraft.

Ultra High Frequency Airborne Radios (key system)

The Ultra High Frequency Avionics (UHF Avionics) are analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225-400 MHz frequency band, which are multi-channel transceivers, installed in an airborne military platform. These airborne devices support the tactical two-way voice communications/ coordination between the military pilot in the military aircraft and the controller on the ground.

Ultra High Frequency Ground Radios (key system)

Ultra High Frequency (UHF) Ground Radios are analog UHF amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 Mhz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and flight service station domains.

Ultra High Frequency Ground Radios - Replacement (key system)

The Ultra High Frequency Ground Radios - Replacement (UHF Ground Radios - Repl) mechanism represents analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 MHz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and Flight Service Station domains.

Very High Frequency Airborne Radios (key system)

Very High Frequency (VHF) Airborne Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 Mhz frequency band which are multi-channel transceivers installed in an airborne platform (e.g., commercial, cargo, and general aviation aircraft). These airborne devices support the tactical two-way voice communications/coordination between the pilot in the aircraft and the controller on the ground.

Very High Frequency Ground Radios (key system)

Very High Frequency (VHF) Ground Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 MHz frequency band which are single-channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the pilot in commercial, cargo, or general aviation aircraft in the oceanic, en route (i.e., ARTCC), terminal (i.e., TRACON/tower), and flight service station domains. Additionally, there are analog VHF frequency modulation (VHF - FM) radio devices operating in the 161 - 174 MHz frequency band that are multi-channel transceivers. These transceivers are used by flight inspection, aviation security, and airway facility specialists supporting local airport operations and maintenance or to perform their operational maintenance mission in support of the NAS. However, these same VHF-FM transceivers are also used to support the resolution of emergency situations or establish a level of voice command and control communications/coordination during disaster recovery.

Very High Frequency Multi-Mode Airborne Radios (key system)

Very High Frequency Multi-Mode Airborne Radios (VHF MM Airborne Radios) refers to an airborne radio operating in the very high frequency (VHF) range capable of operating in the following modes: (1)) analog voice (i.e., 25 kHz spacing for use in the United States and other similarly equipped countries); (2) VHF Digital Link Mode 2 (VDL Mode-2) (two-way digital data transmission); (3) VHF Digital Link Mode 3 (VDL Mode-3), (integrated two-way digital voice/data transmission); and (4) analog voice (i.e., 8.33 kHz spacing for use in Europe and other similarly equipped countries).

Voice Switching and Control System (key system)

The Voice Switching and Control System (VSCS) is installed in the Air Route Traffic Control Center (ARTCC). The VSCS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The VSCS provides the Air Traffic Control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ARTCC (intercom), interconnectivity between controllers in separate ARTCCs (interphone), and interconnectivity between ARTCC controllers and Terminal Radar Approach Control (TRACON) controllers/Airport Traffic Control Tower (ATCT) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ARTCC controllers and pilots is also supported by the VSCS.

Voice Switching and Control System Modification (Control System Upgrade)

The VSCS control system upgrade (VCSU) is a replacement of the Tandem computers that perform the logical switching and control for the VSCS system. The replacement of Tandem computers is for all ARTCCs including three spares.

Voice Switching and Control System Modification (Technological Refresh) (key system)

The Tech Refresh for VSCS is a service life extension. The Tech Refresh encompasses workstation upgrade, video display monitor, control equipment power, VSCU supportability, control shelf power supply, and software development demonstration system expansion.

Voice Switching and Control System Training and Backup Switches

Voice Switching and Control System Training and Backup Switch (VTABS) was developed to meet AT requirements for a separate standalone VSCS Backup and Training System. VTABS can be configured as a 50-position switch with the capability to support air traffic operations in the event of VSCS failure, hardware and software maintenance or power loss.

People

Non-Radar Controller

A Non-Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate transfer of control, communications, and flight data; Ensure computer entries are completed on instructions or clearances issued or received; Ensure strip marking is completed on instructions or clearances issued or received.

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Planning Controller

A Planning Controller performs the following activities: Ensure separation; Initiate control instructions; Operate interphones; Conduct air/ground communications via data link; Coordinate tactical traffic flows; Scan flight data; Correlate with situation data; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the tactical controller when aware of those instructions.

Rescue Coordination Center Specialist

Rescue Coordination Center People consist of personnel from the United States Coast Guard and the United States Air Force who receive information about overdue or missing aircraft from the FAA and coordinate the search and rescue activities within their respective regions.

Supervisory Air Traffic Control Specialist

The supervisor is responsible for overall facility operations during an assigned shift. Duties include ensuring adequate staffing for the operational situation, monitoring operational positions, and ensuring functions are performed in accordance with directives.

Tactical Controller

A Tactical Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios and data link; Oversee data link communications by the associate tactical controller; Accept and initiate automated handoffs; Assist the planning controller with non-automated handoff actions when needed; Assist the planning controller in coordination when needed; Scan the situation display; Correlate with flight data; Ensure computer entries are completed on instructions or clearances you issue or receive.

Interfaces

Air Route Surveillance Radar - Model 1E — (Surveillance Data) → Air Traffic Control Beacon Interrogator - Model 6

The ATCBI-6 correlates return signals from the primary radar with beacon signals and transmits the data to the automation system.

Air Route Surveillance Radar - Model 2 — (Surveillance Data) → Air Traffic Control Beacon Interrogator - Model 6

The ATCBI-6 correlates return signals from the primary radar with beacon signals and transmits the data to the automation system.

Air Route Surveillance Radar - Model 3 — (Surveillance Data) → Air Traffic Control Beacon Interrogator - Model 6

The ATCBI-6 correlates return signals from the primary radar with the beacon signals and transmits the data to the automation system for tracking and display.

Air Route Surveillance Radar - Model 3 — (Surveillance Data) → Microprocessor-En Route Automated Radar Tracking System

The ARSR-3 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the Micro-EARTS for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 4 — (Surveillance Data) → Air Traffic Control Beacon Interrogator - Model 6

The ATCBI-6 correlates return signals from the primary radar with the beacon signals and transmits the data to the automation system for tracking and display.

Air Route Surveillance Radar - Model 4 — (Surveillance Data) → Microprocessor-En Route Automated Radar Tracking System

The ARSR-4 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the Micro-EARTS for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 4 — (Weather Data) → Microprocessor-En Route Automated Radar Tracking System

The ARSR-4 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the Micro-EARTS for processing and use in controlling air traffic in the en route domain.

Air Traffic Control Beacon Interrogator - Model 6 — (Surveillance Data) → Advanced Technologies and Oceanic Procedures

The radar interface is used by ATOP to receive surveillance messages from En Route Surveillance Sources and from Military Surveillance Sources to include Minimally Attended Radar (MAR). ATOP will accept and process surveillance messages using the Common Digitizer-2 (CD-2) format.

Dynamic Ocean Tracking System Plus — (Flight Data) → Dynamic Ocean Tracking System Plus

The DOTS + exchanges flight data.

Dynamic Ocean Tracking System Plus — (Target Data) → Dynamic Ocean Tracking System Plus

The DOTS + exchanges position reports.

Multi-Mode Digital Radios ← (Voice Communication) → Radio Control Equipment

Multi-Mode Digital Radios ← (Voice Communication) → Very High Frequency Airborne Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Multi-Mode Digital Radios ← (Voice Communication) → Very High Frequency Multi-Mode Airborne Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Radio Control Equipment ← (Data Communication) → Radio Control Equipment

Radio Control Equipment ← (Voice Communication) → Voice Switching and Control System

Radio Control Equipment ← (Voice Communication) → Voice Switching and Control System Modification (Technological Refresh)

Ultra High Frequency Ground Radios ← (Voice Communication) → Ultra High Frequency Airborne Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Ultra High Frequency Ground Radios - Replacement ← (Voice Communication) → Ultra High Frequency Airborne Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Very High Frequency Ground Radios ← (Voice Communication) → Very High Frequency Airborne Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Very High Frequency Ground Radios ← (Voice Communication) → Very High Frequency Multi-Mode Airborne Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Voice Switching and Control System — (Voice Communication) → Digital Voice Recorder System

This interface records and temporarily archives voice transmissions.

Voice Switching and Control System ← (Voice Communication) → Multi-Mode Digital Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Voice Switching and Control System ← (Voice Communication) → Ultra High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Voice Switching and Control System ← (Voice Communication) → Ultra High Frequency Ground Radios - Replacement

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Voice Switching and Control System ← (Voice Communication) → Very High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Voice Switching and Control System ← (Voice Communication) → Voice Switching and Control System

This interface enables ATC voice communication between controllers in same or different facilities.

Voice Switching and Control System ← (Voice Communication) → Voice Switching and Control System Modification (Technological Refresh)

This interface enables ATC voice communication between controllers in different facilities.

Voice Switching and Control System Modification (Technological Refresh) — (Voice Communication) → Digital Voice Recorder System
This interface records and temporarily archives voice transmissions.
Voice Switching and Control System Modification (Technological Refresh) ← (Voice Communication) → Multi-Mode Digital Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Voice Switching and Control System Modification (Technological Refresh) ← (Voice Communication) → Ultra High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Voice Switching and Control System Modification (Technological Refresh) ← (Voice Communication) → Ultra High Frequency Ground Radios - Replacement
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Voice Switching and Control System Modification (Technological Refresh) ← (Voice Communication) → Very High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Voice Switching and Control System Modification (Technological Refresh) ← (Voice Communication) → Voice Switching and Control System Modification (Technological Refresh)
This interface enables ATC voice communication between controllers in same or different facilities.

Issues

none identified

Service Group Air Traffic Services
Service ATC-Separation Assurance
Capability Aircraft to Aircraft Separation Capability
Operational Improvement

Current Terminal Separation (102129)

Aircraft to aircraft separation services in terminal airspace ensure a safe distance is maintained between aircraft. Within terminal airspace, requirements for separation vary by airspace Class. Controllers separate aircraft under their control using standard rules for vertical, lateral, longitudinal, or visual separation methods. When potential conflicts exist, an air traffic controller evaluates the situation, develops conflict resolution alternatives, and alerts or issues separation instructions to the aircraft

01-Jan-2007 to 31-Dec-2008

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Terminal air traffic separation consists of rules and techniques to separate aircraft on and around airports. The type of airspace around an airport and the size of the aircraft being separated determine the separation standard that must be applied. Radar and non radar controllers in Air Traffic Control Towers, Terminal Radar Approach Control facilities and at Air Route Traffic Control Centers (ARTCCs) apply terminal separation. At certain locations, in-flight specialists at Automated Flight Service Stations (AFSS) relay terminal separation clearances to pilots. Air traffic controllers must constantly scan radar data and flight data to determine aircraft position, perform traffic planning and resolve conflicts. This constant scanning allows the controller to provide initial departure clearances to aircraft that are conflict-free. This knowledge allows the controller to provide timely radar handoffs, traffic advisories, radar point-outs, and communication transfer. The controller also uses scanning to monitor compliance with clearances already delivered. The airspace around an airport with an operating control tower is designated a "terminal area" and is designated one of several classes, based on its complexity and volume of traffic. The areas are Class B, Class C, or Class D. Each class can have different air traffic separation standards, aircraft equipment requirements, and pilot responsibilities. Aircraft are designated as large, small, or heavy based on their weight. Due to turbulence caused by an aircraft passing through the air, separation standards are applied to pairs of aircraft base upon their size. This separation standard takes precedent over the requirements of other separation rules.

Separation Terminal separation rules apply to the separation of aircraft from aircraft, aircraft from terrain, and aircraft from adjacent protected airspace. Terminal separation of Instrument Flight Rules (IFR) aircraft consists of one or a combination of radar, non radar, and/or visual separation. Radar separation is the preferred method; however, controllers are trained to apply the type of separation that will provide the greatest operational advantage. Radar separation standards are based on the equipment adaptation (single radar site or multiple radar sites), the distance of aircraft from the radar antenna site, and the aircraft size. Radar vectors are used extensively in the terminal areas to manage large volumes of air traffic. The general terminal separation standard is 3 nautical miles (NM) between aircraft at the same altitude.

Non radar separation procedures are based on rules developed before the use of radar. Non radar separation requires more radio communications from pilots to controllers to report route and altitude data. This type of separation is still used in areas with no radar coverage and during radar failures. Non radar separation can be vertical, longitudinal, or lateral. Vertical separation is applied by assigning different altitudes 1,000 feet apart to a pair of aircraft at or below Flight Level (FL) 290. Above FL 290, the standard increases to 2,000 feet apart. Controllers assign an aircraft to an altitude after the aircraft previously at that altitude has reported leaving that altitude. As a general rule, aircraft flying south or west are assigned even cardinal altitudes and aircraft flying north or east are assigned odd cardinal altitudes. Longitudinal separation seeks to ensure that not more than one aircraft can be in the same geographic location at the same time and at the same altitude. Longitudinal separation can be applied to aircraft on the same converging or crossing courses. This type of separation can use the speed difference between the aircraft and can be expressed in miles or in minutes from a fix or airport. Lateral separation is applied by assigning different routings or holding patterns, which do not overlap, to a pair of aircraft. Lateral separation can also be applied to departing aircraft using diverging headings. Visual separation is a clearance from the controller to the pilot that allows the pilot to visually separate his/her aircraft from another aircraft below FL180. The reported weather in the vicinity must be good enough for the pilot to maintain visual contact with the other aircraft. In Class B and Class C terminal airspace, aircraft flying under Visual Flight Rules (VFR) are required to be in contact with air traffic control and are provided separation services. The separation minima in these types of airspace are generally less between IFR and

VFR aircraft than that required between two IFR aircraft. In Class D terminal, airspace VFR pilots are required to be in contact with air traffic control, but do not receive separation services.

Letters of Agreement and Local Procedures Letters of Agreement between adjacent facilities, and local procedures, in Standard Operating Procedures within a facility, can modify terminal separation standards. These letters and procedures cannot reduce separation standards as developed and published at the national level; however, they can increase the standards. These letters and procedures are generally used to ensure that controllers have an understanding of what to expect from aircraft coming from an adjacent facility or from an adjacent controller within their own facility.

Standards Separation standards are published rules that must be followed and maintained. As prescribed by Federal Aviation Administration directives, terminal separation standards are taught to both en route and terminal controllers. The task of obtaining the required separation may require innovation; and once obtained, it must be maintained. There are several times in each flight when a change from one type of separation standard to another must be accomplished. The change can be a result of transitioning from one type of airspace to another, encountering aircraft of different sizes, or transitioning routes and/or altitudes. Various techniques used by air traffic controllers can have an effect on the application of terminal separation. Proper application of separation standards can increase capacity of the National Airspace System (NAS) without changing the separation standard. Technique in this case is the manner in which the controller achieves and maintains the terminal separation required. This can be controller-specific, but more often is facility-specific. Technique is sometimes changed as new separation standards are issued, traffic increases/decreases, or the evaluation of techniques mandates.

Flight Data Certain information about each aircraft and its intended flight plan are required to provide terminal separation. The aircraft's call sign and flight number or the aircraft's registration number is required to communicate separation clearances to the flight. The type of aircraft is required information because certain terminal separation standards change based on the size of the aircraft. Routes of flight and altitude information are necessary when applying lateral or vertical terminal separation. Estimated times over navigational fixes are required for non radar separation. Flight data necessary to provide terminal separation originates with the pilot or the pilot's company. This flight data is generally in the form a Federal Aviation Administration (FAA) flight plan. The flight data enters the NAS computer systems through AFSSs, military base operations (BASOPS), Direct User Access Terminal System, , commercial vendors on the Internet, Air carrier, or Air taxi Operations Centers (AOC), pre filed flight plans, or directly from an FAA facility that has direct access to the NAS computer system. This flight data is provided by automated means to most terminal facilities via Flight Data Input/Output (FDIO) devices. The FDIO receives its data from the Host/oceanic computer system replacement (HOCSR) located in the host ARTCC. Flight data information can also be provided to terminal facilities by non automated means using interphone, teletype, fax, telephone, or air/ground (A/G) radios. For example, flight data on an arrival is passed via interphone from the ARTCC to a terminal facility that does not have FDIO equipment.

Radar Flight data and radar data used to provide separation services between aircraft and airspace are obtained from various FAA automated systems and include primary and backup systems. Radar data is presented to the controller on Automated Radar Terminal System, Display System Replacement, and Standard Terminal Automation Replacement System displays. The radar system being used and/or the distance from the radar site that an aircraft is located can determine terminal separation standards. Most terminal areas use a single-site radar system located on the primary airport. Some large terminal areas have two radar sites that can be manually switched between the two to give the best coverage for a specific area of the airspace. Very large terminal areas sometimes have multiple radar sites. If automation is not available, due to system failure or at non automated facilities, manual procedures are available to provide separation services.

The radar separation standard of 3 NM can only be applied if the separation is within 40 NM of the radar site that is displaying the radar targets. Outside the 40-mile limit, the separation standard increases to five nautical miles. Under certain circumstances (normally a terminal radar outage), en route radar data is sent to terminal facilities and is used as the only radar source. This process is called Center Radar Arts Presentation (CENRAP). If this radar information from the en route environment is adapted to process the best target data available from more than one radar site (mosaic radar adaptation), the separation standard is 5 NM. En route automation can be adapted to provide single radar site coverage. This is often advantageous to terminal facilities in using CENRAP as they can continue to use the 3-NM separation standard within 40 NM of the radar site.

Air/Ground Communications The FAA uses various types of telecommunications switches to provide both air/ground and ground/ground communications. Generally, these switches are FAA owned and have backup systems case the primary system fails. Commercial telephone systems are sometimes used at non towered airports. Use of cell phones is increasing, primarily in communications failure events. Direct A/G communications are not required to provide terminal separation standards at all times. Arriving aircraft with malfunctioning radio equipment can receive clearance information by light-gun signals from the control tower. Departing aircraft that have radio malfunctions that cannot be repaired can receive departure approval via telephone from the control tower and subsequent clearances by light-gun signals.

Direct radio communications between pilots and controllers are required to use certain terminal separation standards. Visual separation requires the controller to be in direct radio contact with at least one of the pilots of aircraft being authorized to apply visual separation standards. Direct pilot/controller communications are required to use the reduced separation standards afforded by simultaneous Instrument Landing System procedures. In certain instances, direct radio communications between the controller and the pilot are not possible. Then, information and clearances can be relayed via an AFSS, AOC, BASOPS, or over the voice capability of a Very High Frequency Omni directional Range (VOR) or VOR Tactical Air Navigation System. Certain repetitive-type messages, like the weather and the active runway(s), are broadcast over the Automatic Terminal Information Service.

Weather and Airport Information The controller and the pilot require current weather information to determine the separation standards applied to aircraft and the type of approach an aircraft can fly. This approach determines sequencing separation from a previous or subsequent arrival. The airport condition can change how terminal separation standards are applied. Closed runways and taxiways can increase the interval between subsequent arrivals. These closures can also impact departures. Equipment outages and runway breaking actions can impact the application of separation standards. Noise abatement procedures and capacity can impact separation standard application at certain airports. Weather information comes from on field sensors and from the National Weather Service meteorologists in the Center Weather Service Unit. Airport information generally comes from the airport sponsor. These data can be posted to the controller on the Systems Atlanta Information Display System. At some facilities, this data is posted via flight progress strips or as written data on a tablet.

Benefits

Current operations are provided in the NAS.

Systems

Air Route Surveillance Radar - Model 1E

The Air Route Surveillance Radar - Model 1E (ARSR-1E) is a 1970s analog radar. It is a long-range radar system with a maximum detection range of 200 nm. The ARSR-1E is a surveillance system used to detect azimuth and slant range of en route aircraft operating between terminal areas. It also provides weather intensity data.

Air Route Surveillance Radar - Model 2

The Air Route Surveillance Radar - Model 2 (ARSR-2) is a 1970s analog radar. It is a long-range radar system with a maximum detection range of 200 nm. The ARSR-2 is a surveillance system used to detect azimuth and slant range of en route aircraft operating between terminal areas. It also provides weather intensity data.

Air Route Surveillance Radar - Model 3

The Air Route Surveillance Radar - Model 3 (ARSR-3) is a 1980s radar that provides primary long range surveillance data, including slant range and azimuth data. It processes the returns which includes demodulation, analog-to-digital conversion, moving target indicator function, sensitivity time control, range and azimuth gating, and digital target extraction - all of which are performed digitally (with the exception of the demodulation and analog-to-digital conversion). In addition, the ARSR-3 has a weather channel with associated processing to provide weather contour information in digital format.

Air Route Surveillance Radar - Model 4

The Air Route Surveillance Radar - Model 4 (ARSR-4) is a three-dimensional, long-range, rotating phased array, primary surveillance radar with integrated height finder capability. It is part of the joint surveillance system (JSS) used in conjunction with ARSR-3 coverage as part of the nationwide air defense command surveillance network. In addition to functions peculiar to the military, the ARSR-4 performs the same basic functions of the ARSR-3, by providing primary long-range surveillance data, including slant range and azimuth data.

Air Traffic Control Beacon Interrogator - Model 4 (key system)

The Air Traffic Control Beacon Interrogator - Model 4 (ATCBI-4) is an air traffic control (ATC) beacon system that interrogates transponder-equipped aircraft. It is a secondary radar system that interrogates transponders, receives aircraft identification, and determines position data.

Air Traffic Control Beacon Interrogator - Model 5 (key system)

The Air Traffic Control Beacon Interrogator - Model 5 (ATCBI-5) is an air traffic control (ATC) beacon system that interrogates transponder-equipped aircraft. It is a secondary radar system that interrogates transponders, receives aircraft identification, and determines position data.

Air Traffic Control Beacon Interrogator - Model 6 (key system)

The Air Traffic Control Beacon Interrogator Model 6 (ATCBI-6) is a ground-based system that interrogates transponders, receives and processes replies from transponders, determines the range and azimuth to the aircraft, and forwards the information to appropriate air traffic control (ATC) automation systems. Replies provide identification and altitude data of the transponder.

Airport Surveillance Radar - Model 11 (key system)

The Airport Surveillance Radar- Model 11 (ASR-11) is a digital, combined primary and secondary surveillance radar (SSR), short-range radar system with a 60 nautical mile (nmi) detection range for medium and small activity airports. The ASR-11 provides advanced digital primary radar including weather intensity surveillance with an integrated monopulse SSR system for use in the airport terminal area. The ASR-11 is used to detect and report the presence and location of an aircraft in a specific volume of airspace. The ASR-11 provides search radar surveillance coverage in controlled airspace primarily in terminal areas.

Airport Surveillance Radar - Model 7 (key system)

The Airport Surveillance Radar - Model 7 (ASR-7) is a short-range (60 nm) analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the Air Traffic Control Beacon Interrogator - Model 4 or Model 5 (ATCBI-4 or ATCBI-5) or Mode S. This system will be replaced by the ASR-11.

Airport Surveillance Radar - Model 8 (key system)

The Airport Surveillance Radar - Model 8 (ASR-8) is a short-range (60 nm), analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the Air Traffic Control Beacon Interrogator - Model 4 or Model 5 (ATCBI-4 or ATCBI-5) or Mode S.

Airport Surveillance Radar - Model 9 (key system)

The Airport Surveillance Radar - Model 9 (ASR-9) is a short range (60 nm) radar system for the airport terminal area. The ASR-9 processes the returns from aircraft targets, which includes demodulation, analog-to-digital conversion, range and azimuth gating, sensitivity timing control, and a moving target detection function. The moving target detector includes two-level weather contour processing, digital signal processing, correlation and interpolation processing, and surveillance processing. The ASR-9 has a separate weather channel with associated processing capable of providing six-level weather contours. The two-level weather contour processing associated with the moving target detector is only be used for backup. The six-level weather channel is primarily used to supplement Next Generation Weather Radar (NEXRAD) coverage. It is normally used in conjunction with Mode Select (Mode S) but it can accommodate an Air Traffic Control Beacon Interrogator Model 4/5 (ATCBI-4/5).

The ASR-9 will be upgraded/replaced with the ASR-9/Mode S SLEP (see separate mechanism) in the 2007-12 time frame.

Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) (key system)

The Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) (ASR-9/Mode S (SLEP)) mechanism provide the necessary technical refresh to extend the service life of the ASR-9 and Mode S through 2030. The

ASTERIX upgrade has not been implemented, but will be implemented at a later date.

Airport Surveillance Radar, Military (key system)

The GPN-20 radar is a military short-range (60 nm) analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the TPX-42 military beacon (interrogate friend or foe, IFF). The GPN-20 is the military version of the FAAs ASR-7/8.

Alaskan National Airspace System Interfacility Communications System (key system)

Alaskan NAS Interfacility Communications System (ANICS) uses FAA-owned satellite earth stations and leased transponders on communications satellites to provide reliable telecommunication services. ANICS Phase I sites provide critical communications with 99.99% availability by using two sets of equipment and two satellites in parallel. ANICS Phase II sites will provide essential communications with 99.9% availability by using one set of equipment and one satellite. ANICS Phase II uses commercial off-the-shelf (COTS) equipment in a redundant configuration to provide high availability and reliability. Phase II sites are enclosed in radomes that protect the equipment and antenna from the weather. The ANICS equipment provides remote maintenance monitoring and control. The equipment is controlled and operated from the Network Operations Control Center (NOCC), centrally located in the Anchorage ARTCC.

Automated Radar Terminal System - Model IIE

The Automated Radar Terminal System - Model IIE (ARTS IIE) provides radar data processing (RDP) and decision support tools to the controller in the terminal environment. Utilized at low to medium-size Terminal Radar Control (TRACONs) Facilities the ARTS IIE is capable of receiving input from up to 2 sensors, can process up to 256 tracks simultaneously, and support up to 22 displays. The ARTS IIE implements the Common ARTS software for improved performance maintenance efficiency. The radar data processing (RDP) software provides automated surveillance tracking and display processing. Included in the ARTS IIE software are decision support tools such as Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Mode C intruder alert, Converging Runway Display Aid (CRDA), and Controller Automation Spacing Aid (CASA).

Automated Radar Terminal System - Model IIIA (key system)

The Automated Radar Terminal System - Model IIIA (ARTS IIIA) provides radar data processing (RDP) and decision support tools to the controller in the terminal environment. Utilized at larger airports, ARTS IIIA is capable of receiving input from up to three sensors, can process up to 900 tracks simultaneously and support up to 36 displays. The RDP software provides automated surveillance tracking and display processing. Included in the ARTS IIIA software are decision support tools such as Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Mode C intruder alert, Converging Runway Display Aid (CRDA), Final Monitor Aid (FMA), and controller automation spacing aid.

Automated Radar Terminal System - Model IIIE (key system)

The Automated Radar Terminal System - Model IIIE (ARTS IIIE) consists of the hardware platform and software required providing radar data processing (RDP) and decision support tools to the controller in the terminal environment. The ARTS IIIE is used at consolidated Terminal Radar Approach Control (TRACON) facilities. The Common ARTS program provided an ARTS IIIE capable of receiving input from up to 15 sensors, the ability to process up to 10,000 tracks simultaneously, and support up to 223 displays. The RDP software provides automated surveillance tracking and display processing including mosaic display of radar data. Included in the ARTS IIIE software are decision support tools such as Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Mode C intruder alert, Converging Runway Display Aid (CRDA), Final Monitor Aid (FMA), and controller automation spacing aid.

Automated Radar Terminal System Color Display (key system)

The Automated Radar Terminal System (ARTS) Color Display (ACD) is a high performance, full function, color display that replaces the Full Digital ARTS Display (FDAD) and the Data Entry and Display Subsystem (DEDS). The ACD supports keyboard and trackball functions for the ARTS IIA, ARTS IIE, and ARTS IIIE. A primary and secondary radar data path to the ACD is provided by a radar gateway function incorporated in the event of a failure of either the ARTS IIE and ARTS IIIA processing systems.

Automated Radar Terminal System Software

Provides maintenace of the Automated Radar Terminal System Software (ARTS S/W) for ARTS IIE, ARTS IIIA and ARTS IIIE. Functions include radar data processing (RDP), Minimum Safe Altitude Warning (MSAW); controller automated spacing tool, Converging Runway Display Aid (CRDA), Final Approach Monitor (FMS), and other tools to assist the terminal and tower controllers to manage the air traffic in the terminal area.

Automated Radar Terminal System Software Modification (All Purpose Structured Eurocontrol Information Exchange, etc,)

Automated Radar Terminal System Software Modification (All Purpose Structured Eurocontrol Information Exchange (ASTERIX), etc,), (ARTS S/W Mod (ASTERIX, etc)). Modification to the ARTS software that will add capabilities including weather product integration on the displays, processing of ASTERIX formatted surveillance data, improved traffic management and surveillance data processing, Ground-Initiated Communications Broadcast (GICB), and terminal data link functionality.

Automatic Dependent Surveillance (Safe Flight 21) Ground Station

The Automatic Dependent Surveillance (Safe Flight 21) Ground Station (ADS (SF-21) Ground Station) is a demonstration system used by the Ohio Valley project under the Safe Flight 21 program. It receives Global Positioning System (GPS)-derived aircraft four (4)-dimensional position data, aircraft identification, aircraft velocity, and other selected aircraft data for processing at selected ATC facilities, and transmits Traffic Information System - Broadcast (TIS-B) information on aircraft in areas of radar coverage (and other airspace status information when available) to properly to equipped aircraft, to support SF-21 operational trials. These ground stations will be located in the regions surrounding Memphis, TN and Louisville, KY, and interface with developmental surveillance processing systems.

Automatic Dependent Surveillance - Broadcast (Capstone) Avionics

Automatic Dependent Surveillance - Broadcast (Capstone) Avionics (ADS-B (Cap) Avionics) are the surveillance avionics used by the Capstone project under Safe Flight 21. These are demonstration avionics that are used to support ADS-B-related operational trials in Alaska.

Digital Airport Surveillance Radar (key system)

The Digital Airport Surveillance Radar (DASR) provides advanced digital primary radar including weather intensity surveillance with an integrated mono-pulse Secondary Surveillance Radar (SSR) system for use in the airport terminal area. (Military version of ASR-11)

Digital Bright Radar Indicator Tower Equipment

The Digital Bright Radar Indicator Tower Equipment (DBRITE) is a tower display system that provides a raster scan presentation of radar/beacon videos and automation system alphanumeric data. The system accepts radar, beacon, external map, analog data, and automation system data.

Digital Voice Recorder System (key system)

Provides modern digital voice recording devices used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

In Feburary 2004, the DVRS was upgraded with a 24-channel card, which replaced the 16-channel card. This minor upgrade, called DVR II, was not extended to the systems installed prior to February 2004.

Digital Voice Recorder System Replacement

The Digital Voice Recorder System Replacement (DVRS Replacement) is a modern digital system used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

Emergency Voice Communications System (key system)

The Emergency Voice Communications System (EVCS) is located at Headquarters (HQ), Regional Offices, several Air Route Traffic Control Centers (ARTCCs), Terminal Radar Approach Control (TRACON) facilities, and other selected sites. EVCS uses two (2) dedicated Federal Telecommunications Service 2001 (FTS2001) dial access channels at most FAA locations. Dedicated dial lines using the Public Switched Telephone Network (PSTN) are used at locations not having direct access to FTS2001. Supports HQ and Regional Communications Command Centers'' functions for accident and incident reports, hijacks, aircraft crashes, aviation security matters, military activities, natural disasters, etc.

Enhanced Terminal Voice Switch (key system)

The Enhanced Terminal Voice Switches (ETVS) are installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) facilities with more than four air traffic controller positions. The ETVS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The ETVS (installed in the ATCT) provides the ATC operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the ETVS.

The ETVS (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within a TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the ETVS.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate ETVS systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Fixed Position Surveillance - Model 117

The Fixed Position Surveillance - Model 117 (FPS-117) radar is a joint-use military surveillance system used by the FAA to detect slant range and azimuth of en route aircraft. These radars are located in Alaska (12) and Hawaii (1), and are expected to be sustained until at least 2020.

Fixed Position Surveillance Model 20 Series

The Fixed Position Surveillance Model 20 Series (FPS-20 Series) is a military primary radar of various models (FPS-20A, FPS-64, FPS-66A, FPS-67/A/B, and ARSR-60M) used by the FAA to detect slant range and azimuth of en route aircraft operating between terminals in the continental United States. Each of the different radar models is a similar variation of the original FPS-20 military radar.

Flight Data Input/Output (key system)

The Flight Data Input/Output (FDIO) system provides flight progress information for use by the Tower, Terminal Radar Approach Control (TRACON) and Air Route Traffic Control Center (ARTCC) controllers. The FDIO system allows Air Traffic Control (ATC) Specialists to input automated flight data, perform data manipulation, and print flight strips.

Full Digital Automated Radar Terminal System Display (key system)

Full Digital ARTS Display (FDAD) is the fully digital ARTS display system that provides the display and data input devices for terminal controllers using ARTS IIIE and ARTS IIIA. The FDAD can work in analog video time share mode or full digital mode. The present application is analog video time share mode.

Heating, Ventilation and Air Conditioning - Long-Range Radar

The Heating, Ventilation and Air Conditioning - Long-Range Radar (HVAC - LRR) mechanism provides the systems to maintain the temperature and relative humidity within the facility at acceptable levels for LRR system operation or personnel comfort as required. This includes filtering of air to Occupational Safety and Health Administration (OSHA) requirements.

High Frequency Airborne Radios (key system)

High Frequency (HF) Airborne Radios are analog (HF multi-channel radio transceivers operating in the 2 - 30 Mhz frequency band installed in airborne commercial, cargo, and military aircraft transiting the oceanic, en route, terminal, or flight service station airspace domains. These transceivers are typically used in transoceanic applications.

Integrated Communications Switching System Type I (key system)

The Integrated Communications Switching System Type I (ICSS I) are installed at Airport Traffic Control Towers (ATCT), Terminal Radar Approach Control (TRACON) facilities, and Automated Flight Service Stations (AFSS).

The ICSS I (installed in the ATCT) provides the air traffic control (ATC) operational ground-ground voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/air traffic control system command center (ATCSCC) specialists. Ground-air radio connectivity between ATCT controllers and pilots is also supported by the ICSS I.

The ICSS I (installed in the TRACON) provides the ATC operational ground-ground voice communications interconnectivity between controllers within TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Ground-air radio connectivity between TRACON controllers and pilots is also supported by the ICSS I.

The ICSS I (installed in the AFSS) provides the ATC operational ground-ground voice communications interconnectivity between specialists within an AFSS (intercom), interconnectivity between specialists in separate AFSSs (interphone), and interconnectivity between Flight Service Station (FSS) specialists and Air Route Traffic Control Center (ARTCC) controllers/TRACON controllers/ATCT controllers/Air Traffic Control System Command Center (ATCSCC) specialists. Ground-air radio connectivity between AFSS specialists and pilots is also supported by the ICSS I.

Integrated Communications Switching System Type II

The Integrated Communications Switching System Type II (ICSS II) are installed at Airport Traffic Control Towers (ATCT), Automated Flight Service Stations(AFSS), and Terminal Radar Approach Control (TRACON) facilities.

The ICSS II (installed in the ATCT) provides the air traffic control (ATC) operational ground-ground voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Ground-air radio connectivity between ATCT controllers and pilots is also supported by the ICSS II.

The ICSS II (installed in the TRACON) provides the ATC operational ground-ground voice communications interconnectivity between controllers within TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC)) controllers/ Flight Service Station (FSS) specialists/air traffic control system command center (ATCSCC) specialists. Ground-air radio connectivity between TRACON controllers and pilots is also supported by the ICSS II.

Leased Inter-facility National Airspace System Communication System

The Leased Inter-facility National Airspace System Communication System (LINCS) provides transmission channels of various industry-standard types between any specified end points, used to satisfy all FAA operational and some administrative telecommunication requirements.

Low-Density Radio Communications Link (key system)

The Low-Density Radio Communications Link (LDRCL) is an FAA owned Low-Density Radio Communications Link (LDRCL) satisfies short-haul, low-density communication requirements. It provides user access (via tail circuits) to a Radio Communications Link (RCL) site or connectivity between two operational facilities

Microprocessor-En Route Automated Radar Tracking System (key system)

The Microprocessor-En Route Automated Radar Tracking System (Micro-EARTS) is a radar processing system implemented with Commercial Off-the-Shelf (COTS) equipment, for use in both En Route and Terminal environments. It provides single sensor and a mosaic display of traffic and weather using long- and short-range radars. At Anchorage, Alaska, Micro-EARTS also provides Automatic Dependent Surveillance-Broadcast (ADS-B) surveillance and display. Micro-EARTS interfaces with multiple types of displays, including Display System Replacement (DSR), Digital Bright Radar Indicator Tower Equipment (DBRITE), and the flat panel tower controller displays.

Mode 3/AC Transponder

A Mode 3/AC Transponder (Mode 3/AC XPNDR) is a device that responds to an Air Traffic Control Radar Beacon System (ATCRBS) or Mode S interrogation by transmitting a 12-bit code that identifies an aircraft. Mode 3 is the military identity mode. Mode A is the civil identity mode. Mode 3 and Mode A are reported in identical formats and are called Mode 3/A. The Mode 3/A code in the field consists of 12-bits divided into four groups (A, B, C, and D) of three bits each. The Mode 3/A identity code consists of only four digits, each digit being the octal representation of one of the four groups in the field and listed in the order ABCD. A Mode C transponder is a device that responds to a Air Traffic Control Radar Beacon System (ATCRBS) or a Mode Select (Mode S) interrogation by transmitting an altitude gray code from the aircraft blind altitude encoder.

Mode Select (key system)

The Mode Select (Mode S) mechanism is a ground-based system capable of selective interrogation of Mode S transponders and general interrogation of Air Traffic Control Radar Beacon System (ATCRBS) transponders within range. The system also receives, processes, and forwards the transponder replies to appropriate air traffic control (ATC) automation systems. Data formats for both interrogation and reply include data exchange capability.

The system also provides a Traffic Information Services (TIS) function that makes local traffic data available to the flight deck via the Mode S data link. TIS, a Mode S data link service, provides automatic traffic advisories to properly equipped aircraft. Pilots are able to request and receive a display of nearby traffic. The relative range, bearing, and altitude (if known) and a "proximate" or "threat" classification of nearby aircraft will be displayed in the cockpit.

Mode Select Transponder

The Mode Select Transponder (Mode S Transponder) is an avionics system that responds to 1,030 MHz interrogations from ground-based sensors or Traffic Alert and Collision Avoidance System (TCAS) airborne avionics with 1,090 MHz replies containing aircraft identification, altitude, and other selected data. Mode S transponders offer improvements over conventional Air Traffic Control Radar Beacon System (ATCRBS) transponders in that they provide over 16 million unique beacon codes, can be selectively interrogated to prevent overlapping or garbling of replies from proximate aircraft, and can provide a high-capacity air-ground data link. In addition to responding to "all call" or "roll call" interrogations from ground-based sensors or TCAS avionics, the Mode S transponders are required to transmit or squitter their 24-bit unique identity and altitude once per second. These squitters are "voluntary" or automatic and not in response to any interrogation. The squitters allow TCAS avionics in proximate aircraft or other systems to acquire Mode S equipped aircraft by only listening on 1,090 MHz.

Multi-Mode Digital Radios (key system)
Multi-Mode Digital Radios (MDRs) are ground-based Very High Frequency (VHF) air-traffic-control radios that can operate in several configurations: 1) analog voice with 25kHz channel spacing; 2) analog voice with 8.33 kHz channel spacing; and 3) VHF Data Link (VDL) Mode-3 which consists of two-way digital voice and data communication.
Power System - Long-Range Radar
The Power System - Long-Range Radar (Pwr Sys - LRR) mechanism provides conditioning of commercial power, including uninterruptible power systems (UPS), to eliminate voltage dropouts, surges, and voltage sags caused by sources outside the facility. Power distribution, grounding, bonding and shielding of electrical system within the facility is also part of the Pwr Sys - LRR.
Radar Automated Display System (key system)
The Radar Automated Display System (RADS) is the Air Traffic Controller workstation for the Automated Radar Terminal System Model IIE (ARTS IIE).
Radio Communication Link (key system)
Radio Communication Link (RCL) is an integrated voice and data microwave transmission system designed to provide the FAA with cost effective and reliable service for its high capacity NAS communications routes. RCL interconnects air route traffic control center (ARTCC) facilities with long range radar installations and other air traffic control (ATC) facilities.
Radio Control Equipment (key system)
Radio Control Equipment (RCE), located at both ATC facilities and remote communication sites, control the operation of remotely located ground to air Very High Frequency/Ultra High Frequency (VHF/UHF) radios used by air traffic controllers to communicate with pilots. RCE interfaces with the voice switch at the ATC facility, telephone landlines, and ground to air radios at the En Route Remote Communications Air/Ground (RCAG) sites, Terminal Remote Transmitter/Receiver (RTR) sites, and Flight Service Station Remote Communications Outlet (RCO) sites.
Rapid Deployment Voice Switch Type I (key system)
The Rapid Deployment Voice Switch Type I (RDVS I) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS I (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the RDVS I. The RDVS I (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the RDVS I.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS I systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.
Rapid Deployment Voice Switch Type II (key system)
The Rapid Deployment Voice Switch Type II (RDVS II) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS II (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the RDVS II. The RDVS II (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the RDVS II.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS II systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.
Rapid Deployment Voice Switch Type IIA

The Rapid Deployment Voice Switch Type IIA (RDVS IIA) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS IIA (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. The RDVS IIA also supports air-to-ground (A/G) radio connectivity between ATCT controllers and pilots. The RDVS IIA (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between TRACON controllers and pilots is also supported by the RDVS IIA.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS IIA systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Remote Automated Radar Terminal System (ARTS) Color Display (key system)

Remote Automated Radar Terminal System Color Display (R-ACD) Description The Remote - Automated Radar Terminal System (ARTS) Color Display (ACD) is a high performance, full function, and color display providing air traffic controllers with the functionality of the Digital Bright Radar Indicator Tower Equipment (DBRITE). This display supports keyboard and trackball functions for the ARTS II, ARTS IIE, and ARTS IIIE. A radar gateway function will be incorporated to provide a primary and secondary radar data path to the R-ACD in the event of failure of both the ARTS II and ARTS IIIA processing systems.

Satellite Communication Airborne Radios

The Satellite Communication (SATCOM) airborne radios are transceivers installed in commercial, cargo, and military aircraft transiting in the National Airspace System (NAS) and are used as an alternate means of voice communications between pilots in aircraft and ground controllers. These transceivers are typically used in transoceanic applications.

Satellite Communication Ground Radios

Satellite Communications (SATCOM) Ground Radios are transceivers installed at oceanic and en route facilities to support an alternative means of tactical air traffic control (ATC) voice communications between ground controllers and pilots in aircraft. These transceivers are typically used in transoceanic applications. These transceivers are also installed at regional facilities and used as an alternate means of communications in case of total ground communications failure or between locations in mountainous terrain or where other means of communications are not possible (e.g., Alaska).

Oceanic air to ground satellite communications are provided via a communications service provider. The FAA currently has no plans to develop or implement its own air to ground SATCOM ground radios.

Small Tower Voice Switch (key system)

The Small Tower Voice Switch (STVS) is installed in small Airport Traffic Control Towers (ATCT) and in Flight Service Stations (FSS). The basic STVS has four operator positions. The STVS provides the Air Traffic Control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and Air Route Traffic Control Center (ARTCC) controllers/ Terminal Radar Approach Control (TRACON) controllers/FSS specialists/air traffic control system command center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the STVS. The STVS (installed in the FSS) provides the ATC operational G/G voice communications interconnectivity between specialists within an FSS (intercom), interconnectivity between specialists in separate FSSs (interphone), and interconnectivity between FSS specialists and Air Route Traffic Control Center (ARTCC) controllers/Terminal Radar Approach Control (TRACON) controllers/ATCT controllers/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground radio connectivity between FSS specialists and pilots is also supported by the STVS.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate STVS systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Standard Terminal Automation Replacement System (key system)

The Standard Terminal Automation Replacement System (STARS) processes primary and secondary radar information to acquire and track data points to display aircraft position for controllers. STARS provides safety tools such as, conflict alert (CA), Mode C intruder (MCI), final monitoring aid (FMA), Minimum Safe Altitude Warning (MSAW), Converging Runway Display Aid (CARDA), and Controller Automated Spacing Aid (CASA). Also, STARS provides the capability to implement the following enhancements: improved radar processing, Global Positioning System (GPS) compatibility, adaptive routing, Center Terminal Radar Approach Control (TRACON) Automation System (CTAS), data link implementation, improved weather display, and better utilization of traffic management information.

Standard Terminal Automation Replacement System Early Display Configuration

The Standard Terminal Automation Replacement System, Early Display Configuration (STARS EDC) provides STARS workstations at a limited number of ARTS IIIA facilities to replace aging DEDS and provide validation of the STARS workstation design before the complete STARS is implemented. STARS EDC will include updates to ARTS software for life cycle maintenance, additional human-machine interface (HMI) requirements for both tower and Terminal Radar Approach Control (TRACON), and Automated Radar Terminal System Model IIIE (ARTS IIIE) human factors validation.

Standard Terminal Automation Replacement System Tower Display Workstation

The Standard Terminal Automation Replacement System Tower Display Workstation (STARS TDW) provides the interface between the ATC Towerl (ATCT) controller and the STARS processing unit.

Surveillance Processor (Safe Flight 21)

The Surveillance Processor (Safe Flight 21) is a demonstration system that receives, processes, and distributes surveillance data between Safe Flight 21 (SF-21) architectural elements to support operational trials. The processor receives surveillance data from various sources, including surveillance sensors, Automatic Dependent Surveillance-Broadcast (ADS-B) systems, multilateration systems, Air Traffic Control (ATC) automation systems, and flight plan processing systems. The processor fuses the various surveillance data to create aircraft track data, which is distributed to various SF-21 architectural elements. One of the capabilities supported by the processor is the processing and distribution of Traffic Information Services - Broadcast (TIS-B) information to ADS (SF-21) Ground Stations, for subsequent transmission to aircraft.

Systems Atlanta Information Display System

A Systems Atlanta Information Display System (SAIDS) enables users to collect and/or input, organize, format, update, disseminate, and display both static and real-time data regarding weather and other rapidly changing critical information to air traffic controllers and Air Traffic Control (ATC) supervisors/Managers. SAIDS is installed at Airport Traffic Control Towers (ATCT), Terminal Radar Approach Control (TRACON) facilities, Air Route Traffic Control Centers (ARTCC), regional offices, and Flight Service Station (FSS) facilities.

Ultra High Frequency Airborne Radios (key system)

The Ultra High Frequency Avionics (UHF Avionics) are analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225-400 MHz frequency band, which are multi-channel transceivers, installed in an airborne military platform. These airborne devices support the tactical two-way voice communications/ coordination between the military pilot in the military aircraft and the controller on the ground.

Ultra High Frequency Ground Radios (key system)

Ultra High Frequency (UHF) Ground Radios are analog UHF amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 Mhz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and flight service station domains.

Ultra High Frequency Ground Radios - Replacement (key system)

The Ultra High Frequency Ground Radios - Replacement (UHF Ground Radios - Repl) mechanism represents analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 MHz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and Flight Service Station domains.

Very High Frequency Airborne Radios (key system)

Very High Frequency (VHF) Airborne Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 Mhz frequency band which are multi-channel transceivers installed in an airborne platform (e.g., commercial, cargo, and general aviation aircraft). These airborne devices support the tactical two-way voice communications/coordination between the pilot in the aircraft and the controller on the ground.

Very High Frequency Ground Radios (key system)

Very High Frequency (VHF) Ground Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 MHz frequency band which are single-channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the pilot in commercial, cargo, or general aviation aircraft in the oceanic, en route (i.e., ARTCC), terminal (i.e., TRACON/tower), and flight service station domains. Additionally, there are analog VHF frequency modulation (VHF - FM) radio devices operating in the 161 - 174 MHz frequency band that are multi-channel transceivers. These transceivers are used by flight inspection, aviation security, and airway facility specialists supporting local airport operations and maintenance or to perform their operational maintenance mission in support of the NAS. However, these same VHF-FM transceivers are also used to support the resolution of emergency situations or establish a level of voice command and control communications/coordination during disaster recovery.

Very High Frequency Multi-Mode Airborne Radios (key system)

Very High Frequency Multi-Mode Airborne Radios (VHF MM Airborne Radios) refers to an airborne radio operating in the very high frequency (VHF) range capable of operating in the following modes: (1)) analog voice (i.e., 25 kHz spacing for use in the United States and other similarly equipped countries); (2) VHF Digital Link Mode 2 (VDL Mode-2) (two-way digital data transmission); (3) VHF Digital Link Mode 3 (VDL Mode-3), (integrated two-way digital voice/data transmission); and (4) analog voice (i.e., 8.33 kHz spacing for use in Europe and other similarly equipped countries).

Western Electric Company Model 301 Voice Switch

The Western Electric Company Model 301 Voice Switch (WECO 301) supports air-to-ground communications between air traffic controllers and pilots and ground-to-ground communications among air traffic control (ATC) personnel.

People

Non-Radar Controller

A Non-Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate transfer of control, communications, and flight data; Ensure computer entries are completed on instructions or clearances issued or received; Ensure strip marking is completed on instructions or clearances issued or received.

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Radar Associate Controller

A Radar Associate Controller performs the following activities: Ensure separation, initiate control instructions; operate interphones; Accept and initiate non-automated handoffs; and ensure radar controller is made aware of the actions; Assist the radar controller by accepting or initiating automated handoffs/pointouts which are necessary for the continued smooth operation of the sector, and ensure that the radar controller is made immediately aware of any action taken; Coordinate, including pointouts; Monitor radios when not performing higher priority duties; Scan flight progress strips; Correlate with radar data; Manage flight progress strips; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the radar controller when aware of those instructions.

Radar Controller

A Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate automated handoffs; Assist the radar associate controller with non-automated handoff actions when needed; Assist the radar associate controller in coordination when needed; Scan radar display; Correlate with flight progress strip information; Ensure computer entries are completed on instructions or clearances you issue or receive; Ensure strip marking is completed on instructions or clearances you issue or receive.

Radar Coordinator

A Radar Coordinator performs the following activities: Perform interfacility/ intrafacility/sector/controller coordination of traffic actions; Advise the radar controller and the radar associate controller of sector actions required to accomplish overall objectives; Perform any of the functions of the sector team which will assist in meeting situation objectives.

Supervisory Air Traffic Control Specialist

The supervisor is responsible for overall facility operations during an assigned shift. Duties include ensuring adequate staffing for the operational situation, monitoring operational positions, and ensuring functions are performed in accordance with directives.

Traffic Management Specialist

Traffic Management Specialists perform the following activities: Balance air traffic demand with the airspace's capacity to maintain maximum and efficient utilization of the NAS; Coordinate and implement traffic management directives if needed for area of responsibility; Monitor and balance traffic flows within the area of responsibility in accordance with traffic management directives; Evaluate effectiveness of traffic management directives and make necessary adjustments; Document delay information.

Interfaces

Air Traffic Control Beacon Interrogator - Model 4 — (Surveillance Data) ➔ Airport Surveillance Radar - Model 9

The ASR-9 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports and then sends the data to an automation system for tracking and display.

Air Traffic Control Beacon Interrogator - Model 4 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIE

The ATCBI-4 sends aircraft identification, position, and altitude to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.

Air Traffic Control Beacon Interrogator - Model 4 — (Surveillance Data) ➔ Microprocessor-En Route Automated Radar Tracking System

The ATCBI-4 sends aircraft identification, position, and altitude to the Micro-EARTS for processing and use in controlling air traffic in the terminal domain from a CERAP.

Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) ➔ Airport Surveillance Radar - Model 9

The ASR-9 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports and then sends the data to an automation system for tracking and display.

Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIA

The ATCBI-5 sends aircraft identification, position, and altitude to the ARTS IIIA for processing and use in controlling air traffic in the terminal domain.

Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIE

The ATCBI-5 sends aircraft identification, position, and altitude to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.

Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) ➔ Microprocessor-En Route Automated Radar Tracking System

The ATCBI-4 sends aircraft identification, position, and altitude to the Micro-EARTS for processing and use in controlling air traffic in the en route domain, as well as in terminal domains associated with CERAPs.

Airport Surveillance Radar - Model 11 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIE

The ASR-11 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 11 — (Weather Data) ➔ Automated Radar Terminal System - Model IIIE

The ASR primary radar provides detected weather data to the ARTS for processing.

Airport Surveillance Radar - Model 11 — (Surveillance Data) ➔ Microprocessor-En Route Automated Radar Tracking System

The ASR-11 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the automation equipment interface, which then routes the data to the Micro EARTS for processing and use in controlling air traffic in the en route domain.

Airport Surveillance Radar - Model 11 — (Surveillance Data) ➔ Standard Terminal Automation Replacement System

The ASR-11 ground radar provides aircraft positional data (azimuth and slant range) to STARS for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 11 — (Weather Data) ➔ Standard Terminal Automation Replacement System

The ASR-11 provides weather radar data to the STARS application interface gateway for display on its TCW and TDW displays. The radar and local controller uses these data to indicate the precipitation levels present within the TRACON and airport.

Airport Surveillance Radar - Model 7 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIE

The ASR-7 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 7 — (Weather Data) ➔ Automated Radar Terminal System - Model IIIE

The ASR-7 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 7 — (Surveillance Data) ➔ Microprocessor-En Route Automated Radar Tracking System

The ASR-7 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the Micro-EARTS for processing and use in controlling air traffic in the terminal domain from a CERAP.

Airport Surveillance Radar - Model 7 — (Surveillance Data) ➔ Mode Select

The MODE S system correlates the primary radar returns with beacon data and transmits them to the automation system for tracking and display.

Airport Surveillance Radar - Model 8 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIA

The ASR-8 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIA for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 8 — (Weather Data) ➔ Automated Radar Terminal System - Model IIIA

The ASR-8 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIIA for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 8 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIE

The ASR-8 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 8 — (Weather Data) ➔ Automated Radar Terminal System - Model IIIE

The ASR-8 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 8 — (Surveillance Data) ➔ Microprocessor-En Route Automated Radar Tracking System

The ASR-8 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the Micro-EARTS for processing and use in controlling air traffic in the terminal domain from a CERAP.

Airport Surveillance Radar - Model 8 — (Surveillance Data) ➔ Mode Select

The MODE S system correlates the primary radar returns with beacon data via a Beacon Video Reconstitutor (BVR) and transmits them to the automation system for tracking and display.

Airport Surveillance Radar - Model 9 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIA
The ASR-9 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIA for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 9 — (Weather Data) ➔ Automated Radar Terminal System - Model IIIA
The ASR terminal radar provides detected weather data to the ARTS for processing.
Airport Surveillance Radar - Model 9 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIE
The ASR-9 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 9 — (Weather Data) ➔ Automated Radar Terminal System - Model IIIE
The ASR primary radar provides detected weather data to the ARTS for processing.
Airport Surveillance Radar - Model 9 — (Surveillance Data) ➔ Standard Terminal Automation Replacement System
The ASR-9 ground radar provides aircraft positional data (azimuth and slant range) to STARS for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 9 — (Weather Data) ➔ Standard Terminal Automation Replacement System
The ASR-9 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the STARS for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) — (Surveillance Data) ➔ Standard Terminal Automation Replacement System
The ASR-9 ground radar provides aircraft positional (azimuth and slant range) as well as time tag, identification, and intent data in ASTERIX format to STARS for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar, Military — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIA
The GPN-20 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIA for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar, Military — (Weather Data) ➔ Automated Radar Terminal System - Model IIIA
The GPN-20 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIIA use in controlling air traffic in the terminal domain.
Airport Surveillance Radar, Military — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIE
The GPN-20 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar, Military — (Weather Data) ➔ Automated Radar Terminal System - Model IIIE
The GPN-20 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIIE use in controlling air traffic in the terminal domain.
Automated Radar Terminal System - Model IIIA — (Flight Data) ➔ Automated Radar Terminal System Color Display
The ACD displays ARTS flight data to the controller.
Automated Radar Terminal System - Model IIIA — (Track Data) ➔ Automated Radar Terminal System Color Display
The ARTS sends track data to the ACD for controller use.
Automated Radar Terminal System - Model IIIA — (Track Data) ➔ Full Digital Automated Radar Terminal System Display
Track data are exchanged between ARTS IIIA and the controller using FDAD.
Automated Radar Terminal System - Model IIIE — (Flight Data) ➔ Automated Radar Terminal System Color Display
The ACD displays ARTS flight data to the controller.
Automated Radar Terminal System - Model IIIE — (Track Data) ➔ Automated Radar Terminal System Color Display
The ARTS sends track data to the ACD for controller use.
Automated Radar Terminal System - Model IIIE — (Track Data) ➔ Full Digital Automated Radar Terminal System Display
Track data are exchanged between ARTS IIIE and the controller using FDAD.
Enhanced Terminal Voice Switch — (Voice Communication) ➔ Digital Voice Recorder System
This interface records and temporarily archives voice transmissions.
Enhanced Terminal Voice Switch ⇐ (Voice Communication) ➔ Enhanced Terminal Voice Switch
This interface enables ATC voice communication between controllers in same or different facilities.
Enhanced Terminal Voice Switch ⇐ (Voice Communication) ➔ Integrated Communications Switching System Type I
This interface enables ATC voice communication between controllers in different facilities.
Enhanced Terminal Voice Switch ⇐ (Voice Communication) ➔ Multi-Mode Digital Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Enhanced Terminal Voice Switch ⇐ (Voice Communication) ➔ Rapid Deployment Voice Switch Type I
This interface enables ATC voice communication between controllers in different facilities.
Enhanced Terminal Voice Switch ⇐ (Voice Communication) ➔ Rapid Deployment Voice Switch Type II
This interface enables ATC voice communication between controllers in different facilities.
Enhanced Terminal Voice Switch ⇐ (Voice Communication) ➔ Small Tower Voice Switch
This interface enables ATC voice communication between controllers in different facilities.
Enhanced Terminal Voice Switch ⇐ (Voice Communication) ➔ Ultra High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Enhanced Terminal Voice Switch ⇐ (Voice Communication) ➔ Ultra High Frequency Ground Radios - Replacement
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Enhanced Terminal Voice Switch ⇐ (Voice Communication) ➔ Very High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Flight Data Input/Output ⇐ (Flight Data) ➔ Flight Data Input/Output
The FDIOs in ARTCCs, TRACONs, ATCTs, and two Oceanic centers (New York and Oakland) exchange flight data with FDIOs in other ARTCCs, FDIOs TRACONs, ATCTs, and two Oceanic Centers (New York and Oakland).
Integrated Communications Switching System Type I — (Voice Communication) ➔ Digital Voice Recorder System
This interface records and temporarily archives voice transmissions.
Integrated Communications Switching System Type I ⇐ (Voice Communication) ➔ Integrated Communications Switching System Type I
This interface enables ATC voice communication between controllers in same or different facilities.
Integrated Communications Switching System Type I ⇐ (Voice Communication) ➔ Multi-Mode Digital Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Integrated Communications Switching System Type I ⇐ (Voice Communication) ➔ Rapid Deployment Voice Switch Type I

This interface enables ATC voice communication between controllers in different facilities.

Integrated Communications Switching System Type I ← (Voice Communication) → Rapid Deployment Voice Switch Type II

This interface enables ATC voice communication between controllers in different facilities.

Integrated Communications Switching System Type I ← (Voice Communication) → Small Tower Voice Switch

This interface enables ATC voice communication between controllers in different facilities.

Integrated Communications Switching System Type I ← (Voice Communication) → Ultra High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Integrated Communications Switching System Type I ← (Voice Communication) → Ultra High Frequency Ground Radios - Replacement

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Integrated Communications Switching System Type I ← (Voice Communication) → Very High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Mode Select — (Surveillance Data) → Airport Surveillance Radar - Model 9

The ASR-9 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports and then sends the data to an automation system for tracking and display.

Mode Select — (Surveillance Data) → Automated Radar Terminal System - Model IIIA

The Mode S sends aircraft identification, position, and altitude to the ARTS IIIA for processing and use in controlling air traffic in the terminal domain.

Mode Select — (Surveillance Data) → Automated Radar Terminal System - Model IIIE

The Mode S sends aircraft identification, position, and altitude to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.

Mode Select — (Surveillance Data) → Standard Terminal Automation Replacement System

The Mode S sends aircraft identification, position, and altitude to STARS for processing and use in controlling air traffic in the terminal domain.

Multi-Mode Digital Radios ← (Voice Communication) → Radio Control Equipment

Multi-Mode Digital Radios ← (Voice Communication) → Very High Frequency Airborne Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Multi-Mode Digital Radios ← (Voice Communication) → Very High Frequency Multi-Mode Airborne Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Radio Control Equipment ← (Voice Communication) → Enhanced Terminal Voice Switch

Radio Control Equipment ← (Voice Communication) → Integrated Communications Switching System Type I

Radio Control Equipment ← (Data Communication) → Radio Control Equipment

Radio Control Equipment ← (Voice Communication) → Rapid Deployment Voice Switch Type I

Radio Control Equipment ← (Voice Communication) → Rapid Deployment Voice Switch Type II

Radio Control Equipment ← (Voice Communication) → Small Tower Voice Switch

Rapid Deployment Voice Switch Type I — (Voice Communication) → Digital Voice Recorder System

This interface records and temporarily archives voice transmissions.

Rapid Deployment Voice Switch Type I ← (Voice Communication) → Multi-Mode Digital Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Rapid Deployment Voice Switch Type I ← (Voice Communication) → Rapid Deployment Voice Switch Type I

This interface enables ATC voice communication between controllers in same or different facilities.

Rapid Deployment Voice Switch Type I ← (Voice Communication) → Rapid Deployment Voice Switch Type II

This interface enables ATC voice communication between controllers in different facilities.

Rapid Deployment Voice Switch Type I ← (Voice Communication) → Small Tower Voice Switch

This interface enables ATC voice communication between controllers in different facilities.

Rapid Deployment Voice Switch Type I ← (Voice Communication) → Ultra High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Rapid Deployment Voice Switch Type I ← (Voice Communication) → Ultra High Frequency Ground Radios - Replacement

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Rapid Deployment Voice Switch Type I ← (Voice Communication) → Very High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Rapid Deployment Voice Switch Type II — (Voice Communication) → Digital Voice Recorder System

This interface records and temporarily archives voice transmissions.

Rapid Deployment Voice Switch Type II ← (Voice Communication) → Multi-Mode Digital Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Rapid Deployment Voice Switch Type II ← (Voice Communication) → Rapid Deployment Voice Switch Type II

This interface enables ATC voice communication between controllers in same or different facilities.

Rapid Deployment Voice Switch Type II ← (Voice Communication) → Small Tower Voice Switch

This interface enables ATC voice communication between controllers in different facilities.

Rapid Deployment Voice Switch Type II ← (Voice Communication) → Ultra High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Rapid Deployment Voice Switch Type II ← (Voice Communication) → Ultra High Frequency Ground Radios - Replacement

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Rapid Deployment Voice Switch Type II ← (Voice Communication) → Very High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Small Tower Voice Switch — (Voice Communication) → Digital Voice Recorder System

This interface records and temporarily archives voice transmissions.

Small Tower Voice Switch ← (Voice Communication) → Multi-Mode Digital Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Small Tower Voice Switch ← (Voice Communication) → Small Tower Voice Switch

This interface enables ATC voice communication between controllers in same or different facilities.

Small Tower Voice Switch ← (Voice Communication) → Ultra High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Small Tower Voice Switch ← (Voice Communication) → Ultra High Frequency Ground Radios - Replacement

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Small Tower Voice Switch ← (Voice Communication) → Very High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Ultra High Frequency Ground Radios ← (Voice Communication) → Ultra High Frequency Airborne Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Ultra High Frequency Ground Radios - Replacement ← (Voice Communication) → Ultra High Frequency Airborne Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Very High Frequency Ground Radios ← (Voice Communication) → Very High Frequency Airborne Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Very High Frequency Ground Radios ← (Voice Communication) → Very High Frequency Multi-Mode Airborne Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Issues

none identified

Service Group Air Traffic Services
Service ATC-Separation Assurance
Capability Aircraft to Aircraft Separation Capability
Operational Improvement

Evolve Oceanic Procedures to Domestic En Route Separation (102136)

Implementing enhanced communication navigation systems (CNS) and avionics capabilities results in oceanic separation standard minima and procedures becoming more like domestic en route operations and procedures. Improved oceanic automation (satellite, aircraft, surface) enables controllers to apply reduced vertical, longitudinal, and lateral separation standards.

31-Jan-2016 to 31-Jan-2023

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

As demand increases, using the oceanic track structure becomes a hindrance to flight efficiency. The larger separation minima and structured control begin to put an increasing proportion of aircraft in disadvantageous tracks and positions. By moving to en route-like surveillance, navigation performance, and communications, the increasing number of aircraft can be managed within smaller volumes of airspace, maximizing the number of aircraft that are subject to the most advantageous winds. Using advanced communications, navigation, and surveillance/air traffic management technology, such as Enhanced Advanced Technology and Oceanic Procedures (E-ATOP), Standard Automation Platform, and Flight Object Management System, and new procedures permit oceanic separation assurance services to be provided in the same manner as in domestic en route airspace. Space-based surveillance (automatic dependant surveillance) via the Surveillance Data Network and future communications technology provides controllers a display of oceanic traffic on the Standard Automation Platform Workstation and direct communications with pilots. The Aeronautical Information Management system provides timely observation and distribution of reliable weather, NAS status, and other flight data via the System Wide Information Management system to users and service providers. The traffic display permits controllers to use radar-like procedures and reduced separation standards from procedural minima sized to match surveillance and communications performance. This provides timely resolution of conflicts and positive control to weather and emergency-related deviations, and maintains a more efficient traffic flow. Advanced decision support systems available through the Integrated Information Workstation and improved capabilities of the flight deck permit controllers to authorize airborne separation assurance services when operationally advantageous. Improved capabilities have replaced the oceanic track system with user-preferred profiles, except for high-density areas, to avoid weather, or to accommodate special events.

Direct pilot-controller communications, including common use of data-link services, provide a seamless system for real-time control instructions, immediate feedback during pilot-requested routing or altitude changes; immediate acknowledgement and planning for deviations around weather; reduction in communications complexity during in-flight emergencies; and enhanced capabilities for search and rescue operations.

Benefits

E-ATOP surveillance capabilities combined with direct controller-pilot communications via voice or data link enable controllers to detect, intervene, and mitigate the risk of conflict with other aircraft when an aircraft deviates from the clearance. Oceanic separation standards mirror domestic en route separation standards. Flight operators are able to individually tailor requested flight profiles to meet their business objectives.

Systems

Aeronautical Information Management (key system)

The AIM system represents the evolution of the acquisition, storage, processing and dissemination of aeronautical information in the NAS. Aeronautical information is defined as any information concerning the establishment, condition, or change in any component (facility, service, or procedure of, of hazard) of the National Airspace System. Aeronautical information comes in two types a somewhat static type, and a more dynamic type. The static portion represents the aeronautical information baseline as a particular date, while the dynamic portion updates particular aspects of the static portion due to system impacts or events. The Static portion represents data that NAS automation systems and other users use to adapt their software to properly operate. The dynamic portion represents information typically contained in NOTAMs that indicate short-term changes to the static data.

Many NAS systems support the acquisition, generation, and dissemination of the static aeronautical information. Information of this type includes airspace structures, airways, locations of NAS facilities, inter-facility letters of agreement and memorandums of understanding, obstructions, standard procedures, airspace charts, etc.

Several NAS systems also support the acquisition, generation, processing, and dissemination of the dynamic aeronautical information. Information of this type includes, facility outages, runway closures, temporary flight restrictions, airspace constraints, SIGMETs, etc. This information must be disseminated to users and providers of air traffic services in a timely and efficient manner.

AIM will provide the central point for the dissemination of high quality, configuration controlled information to NAS systems, service providers and users of the NAS. AIM will disseminate data based on the Aeronautical Information Exchange Model (AIXM) protocols.

Air Route Surveillance Radar - Model 1E

The Air Route Surveillance Radar - Model 1E (ARSR-1E) is a 1970s analog radar. It is a long-range radar system with a maximum detection range of 200 nm. The ARSR-1E is a surveillance system used to detect azimuth and slant range of en route aircraft operating between terminal areas. It also provides weather intensity data.

Air Route Surveillance Radar - Model 2

The Air Route Surveillance Radar - Model 2 (ARSR-2) is a 1970s analog radar. It is a long-range radar system with a maximum detection range of 200 nm. The ARSR-2 is a surveillance system used to detect azimuth and slant range of en route aircraft operating between terminal areas. It also provides weather intensity data.

Air Route Surveillance Radar - Model 3

The Air Route Surveillance Radar - Model 3 (ARSR-3) is a 1980s radar that provides primary long range surveillance data, including slant range and azimuth data. It processes the returns which includes demodulation, analog-to-digital conversion, moving target indicator function, sensitivity time control, range and azimuth gating, and digital target extraction - all of which are performed digitally (with the exception of the demodulation and analog-to-digital conversion). In addition, the ARSR-3 has a weather channel with associated processing to provide weather contour information in digital format.

Air Route Surveillance Radar - Model 4

The Air Route Surveillance Radar - Model 4 (ARSR-4) is a three-dimensional, long-range, rotating phased array, primary surveillance radar with integrated height finder capability. It is part of the joint surveillance system (JSS) used in conjunction with ARSR-3 coverage as part of the nationwide air defense command surveillance network. In addition to functions peculiar to the military, the ARSR-4 performs the same basic functions of the ARSR-3, by providing primary long-range surveillance data, including slant range and azimuth data.

Air Traffic Control Beacon Interrogator - Model 6

The Air Traffic Control Beacon Interrogator Model 6 (ATCBI-6) is a ground-based system that interrogates transponders, receives and processes replies from transponders, determines the range and azimuth to the aircraft, and forwards the information to appropriate air traffic control (ATC) automation systems. Replies provide identification and altitude data of the transponder.

Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program)

The Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) (ASR-9/Mode S (SLEP)) mechanism provide the necessary technical refresh to extend the service life of the ASR-9 and Mode S through 2030. The ASTERIX upgrade has not been implemented, but will be implemented at a later date.

Digital Voice Recorder System Replacement

The Digital Voice Recorder System Replacement (DVRS Replacement) is a modern digital system used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

En Route Next Generation Secondary Surveillance Radar

En Route Next Generation Secondary Surveillance Radar (En Route (NEXGEN SS-ER)) is a future generation surveillance system capable of providing cooperative surveillance capabilities commensurate with the technology at the time.

Enhanced-Advanced Technologies and Oceanic Procedures

E-ATOP will provide and manage automation and information to control Oceanic air traffic. E-ATOP will facilitate seamless aircraft transitions and data transfers between domestic and oceanic airspace.

Fixed Position Surveillance - Model 117

The Fixed Position Surveillance - Model 117 (FPS-117) radar is a joint-use military surveillance system used by the FAA to detect slant range and azimuth of en route aircraft. These radars are located in Alaska (12) and Hawaii (1), and are expected to be sustained until at least 2020.

Fixed Position Surveillance Model 20 Series

The Fixed Position Surveillance Model 20 Series (FPS-20 Series) is a military primary radar of various models (FPS-20A, FPS-64, FPS-66A, FPS-67/A/B, and ARSR-60M) used by the FAA to detect slant range and azimuth of en route aircraft operating between terminals in the continental United States. Each of the different radar models is a similar variation of the original FPS-20 military radar.

Flexible Voice Switch (key system)

Voice communications is the primary means of communications among ATC facilities and between an Air Traffic Control Specialist (ATCS) and a pilot. Voice switching provides the ATCS both G/G Interfacility/Intrafacility and A/G voice communications connectivity. The NAS Voice Switch (NVS) program will replace aging voice switches and their analog interfaces with modern digital voice switches consisting of digital interfaces. The Flexible Voice Switch will be the common platform and baseline voice switch for all NAS domains with modularity and scalability to meet communications connectivity requirements. Additionally, this switch will be expandable to accommodate growth capacity requirements and able to support NAS Modernization needs as described in various Operational Improvements.

Flight Object Management System - En Route

The FOMS is a component of the Standard Automation Platform (SAP). The FOMS processes flight data received from multiple sources via the System Wide Information Management (SWIM) Management Unit. The FOMS also receives track data from the Surveillance Data Processor and associates tracks with flight data, producing the flight object, which is published to SWIM for subscriber use. Flight plan support functionality includes end-to-end profile evaluation in all phases of flight and evaluation against static and dynamic constraints (terrain, obstacles, airspace restrictions, etc.). The FOMS supports flight planning up to 180 days prior to day of flight. A user can access the flight object from initial to closeout in the same manner. The FOMS provides end-to-end flight data management from preflight to post analysis. Ownership of the flight object begins and ends with Traffic Flow Management and transitions during the flight to clearance delivery, ramp, surface, departure, transition to cruise, cruise, transition to arrival, and ramp. Flight data management is based on trajectory, assigned volumes, and "necessary" route structure.

Heating, Ventilation and Air Conditioning - Long-Range Radar

The Heating, Ventilation and Air Conditioning - Long-Range Radar (HVAC - LRR) mechanism provides the systems to maintain the temperature and relative humidity within the facility at acceptable levels for LRR system operation or personnel comfort as required. This includes filtering of air to Occupational Safety and Health Administration (OSHA) requirements.

High Frequency Ground Radios

High Frequency (HF) Ground Radios are analog HF radio devices operating in the 2 - 30 Mhz frequency band, which may be single channel transmitters and receivers or multi-channel transceivers. These radio devices are installed at oceanic and en route facilities and used to support tactical air traffic control (ATC) voice communications between a ground controller and a pilot in an aircraft in the oceanic domain. Additionally, these devices are also installed at regional facilities and used to support voice command and control communications /coordination in emergency or during disaster recovery situations occurring in the NAS.

Integrated Information Workstation - Build 1 (key system)

IIW Build 1 will include the infrastructure and system interfaces to acquire, analyze, store, update, display, and manage the following information in an integrated manner: (1) National Airspace System (NAS) aeronautical, (2) airport environmental, (3) airborne and surface surveillance, (4) flight information, (5) weather information, and (6) NAS status. Build 1 will also replace its predecessor system, FAA Data Display System, as well as interface with the following systems in support of its mission: Flight Object Management, System Wide Information Management, Next Generation- Traffic Flow Management, Maintenance Management System, Unified Decision Management System, and Aeronautical Information Management.

Integrated Information Workstation - Build 2

Build 2 will incorporate new hardware technology and software enhancements through a technical refresh program.

Low-Density Radio Communications Link

The Low-Density Radio Communications Link (LDRCL) is an FAA owned Low-Density Radio Communications Link (LDRCL) satisfies short-haul, low-density communication requirements. It provides user access (via tail circuits) to a Radio Communications Link (RCL) site or connectivity between two operational facilities

Multi-Mode Digital Radios

Multi-Mode Digital Radios (MDRs) are ground-based Very High Frequency (VHF) air-traffic-control radios that can operate in several configurations: 1) analog voice with 25kHz channel spacing; 2) analog voice with 8.33 kHz channel spacing; and 3) VHF Data Link (VDL) Mode-3 which consists of two-way digital voice and data communication.

Radio Communication Link

Radio Communication Link (RCL) is an integrated voice and data microwave transmission system designed to provide the FAA with cost effective and reliable service for its high capacity NAS communications routes. RCL interconnects air route traffic control center (ARTCC) facilities with long range radar installations and other air traffic control (ATC) facilities.

Radio Control Equipment

Radio Control Equipment (RCE), located at both ATC facilities and remote communication sites, control the operation of remotely located ground to air Very High Frequency/Ultra High Frequency (VHF/UHF) radios used by air traffic controllers to communicate with pilots. RCE interfaces with the voice switch at the ATC facility, telephone landlines, and ground to air radios at the En Route Remote Communications Air/Ground (RCAG) sites, Terminal Remote Transmitter/Receiver (RTR) sites, and Flight Service Station Remote Communications Outlet (RCO) sites.

Satellite Communication Airborne Radios

The Satellite Communication (SATCOM) airborne radios are transceivers installed in commercial, cargo, and military aircraft transiting in the National Airspace System (NAS) and are used as an alternate means of voice communications between pilots in aircraft and ground controllers. These transceivers are typically used in transoceanic applications.

Standard Automation Platform Convergence Phase 1 (key system)

The purpose of Standard Automation Platform Convergence Phase 1 (SAP Conv P1) is to reduce both procurement and recurring costs by standardizing and sharing as many hardware and software ATC Automation components as possible.

An engineering convergence task will begin in fiscal year 2005 and run through 2015. All components from each of the automation systems (STARS, ERAM, TFM, etc.) will be analyzed, and the "best of breed" and "core" components will be selected. SAP convergence will be performed in the following areas: (1) Hardware; (2) System Software (operating systems, Commercial-Off-The-Shelf tools, etc.); (3) ATC applications that can be shared across domains; (4) ATC applications that are unique to a domain; and (5) ATC system support tools that can be shared across domains (adaptation, data extraction or systems analysis recording, data reduction and analysis tools, etc.). Proven STARS and ERAM components will be slected, integrated into the SAP, and rigorously tested for replacing STARS and ERAM components at or near their end of service life.

Prototyping begun under Phase 1 will continue with SAP Conv P2. The results of both efforts will lead to refining the requirements to develop the SAP WS mechanism with SDP and FOMS applications.

Standard Automation Platform Workstation Phase 1 (key system)

The SAP consists of the Flight Object Management System (FOMS), the Surveillance Data Processor (SDP), and the SAP Workstation. The SAP will be installed in En Route and Arrival/Departure facilities. The SDP performs surveillance data processing and tracking on Surveillance Data Objects received from the Surveillance Data Network. The FOMS performs flight plan processing, associates flight and track data, and publishes the Flight Object on the System Wide Information Management network. The SAP workstation provides the controller interface for the FOMS and SDP.

Surveillance Data Network (key system)

National Airspace System (NAS) surveillance systems, including radar and automatic dependent surveillance systems will provide surveillance data objects via the Surveillance Data Network (SDN), which is a sub-network of the System Wide Information Management (SWIM) and the FAA Telecommunication Infrastructure (FTI). The published Surveillance Data Objects (SDO) will be made available to NAS and other users, including the Transportation Security Administration, Department of Defense, and others. Surveillance data availability supports 3-mile separation standards, gate-to-gate traffic management, seamless airspace, and dynamic resectorization. Improved surveillance information is provided in a timely and consistent manner seamlessly across the NAS for operations, planning, and decision making. The information will be available to all users and service providers via SDO in near real time. This information enables decisions to be based on a shared common view of situations, even as conditions are changing. Improved surveillance with SDOs will provide the automation higher quality of data for seamless surveillance and, in combination with other capabilities and new procedures, enable capacity and safety improvements. These benefits accrue from increased situation awareness by decision makers and improved operation of decision support and analysis tools that use surveillance information.

Surveillance Data Processor (key system)

SDP is a component of SAP and operates in En Route and Terminal. The SDP will make improvements to sensors and automation systems that will allow for expanded use of 3-mile separation and terminal procedures. The operational improvements enable more efficient control of aircraft and use of airspace. To accomplish this, all 1030/1090 Beacon interrogators will be upgraded to disseminate their existing 1.2 milli-radian azimuth accuracy and other information, such as time of measurement, confidence, quality, and so on. The automation system algorithms will be improved or new algorithms will be developed to exploit the additional information content of the improved surveillance reports. The method of presentation (display) to support 3-mile separation will be developed and tested to ensure safety. The existing long-range sensor surveillance update period is (12 seconds) and is insufficient to support 3-mile separation. In areas where only long-range sensors exist and where the Air Traffic Service requires 3-mile separation, these sensors may be modified to double the update rate to achieve 3-mile separation.

System Wide Information Management Build 1B

Build 1B provides all items in 1A, including more NAS information. This build integrates Flight and Surveillance Information systems into the SWIM architecture.

Ultra High Frequency Airborne Radios

The Ultra High Frequency Avionics (UHF Avionics) are analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225-400 MHz frequency band, which are multi-channel transceivers, installed in an airborne military platform. These airborne devices support the tactical two-way voice communications/ coordination between the military pilot in the military aircraft and the controller on the ground.

Ultra High Frequency Ground Radios - Replacement

The Ultra High Frequency Ground Radios - Replacement (UHF Ground Radios - Repl) mechanism represents analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 MHz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and Flight Service Station domains.

Very High Frequency Ground Radios

Very High Frequency (VHF) Ground Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 MHz frequency band which are single-channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the pilot in commercial, cargo, or general aviation aircraft in the oceanic, en route (i.e., ARTCC), terminal (i.e., TRACON/tower), and flight service station domains. Additionally, there are analog VHF frequency modulation (VHF - FM) radio devices operating in the 161 - 174 MHz frequency band that are multi-channel transceivers. These transceivers are used by flight inspection, aviation security, and airway facility specialists supporting local airport operations and maintenance or to perform their operational maintenance mission in support of the NAS. However, these same VHF-FM transceivers are also used to support the resolution of emergency situations or establish a level of voice command and control communications/coordination during disaster recovery.

Support Activities

AT Procedure Development for Evolve Oceanic Procedures to Domestic En Route Separation

Air Traffic Procedures document air traffic services and how they are implemented. The introduction of new systems, or changes to existing systems, may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

AT Training for Evolve Oceanic Procedures to Domestic En Route Separation

Air Traffic (AT) training is provided to the AT workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AT Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

FAA Certification for Evolve Oceanic Procedures to Domestic En Route Separation

FAA certification is an activity necessary to support people and systems in the delivery of NAS services. Avionics and associated systems are deemed to be critical to the safety of flight and must be certificated. In addition certain operators and service providers require to be certified such as pilots, dispatchers and others. Certification will generally begin 24 months prior to Initial Operating Capability, and be complete prior to receiving or giving service.

FAA Rulemaking for Evolve Oceanic Procedures to Domestic En Route Separation

FAA Rulemaking is necessary when Federal Air Regulations require or change the delivery of NAS services. The regulatory process must be complete prior to implement or service provision. The lead time for change vary greatly due to the varieties of scope but will take a minimum of 180 days before implemented.

Non-FAA Pilot Procedure Development for Evolve Oceanic Procedures to Domestic En Route Separation

A number of NAS users document the way their activities are to be carried out. The introduction of new systems, or changes to existing systems may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development will generally begin once ATC procedures have been established and be complete by 90 days prior to Initial Operating Capability, in order to facilitate training.

Non-FAA Pilot Training for Evolve Oceanic Procedures to Domestic En Route Separation

Non-FAA Pilot Training is provided to educate pilots as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional pilot training. Training will generally begin 60 days prior to IOC and be complete within one year following Full Operating Capability.

People

Federal Aviation Administration Headquarters Personnel

Captures personnel costs for non air traffic personnel and airway facilities (AAF) installations staff. Contains operations and maintenance (O&M) costs for personnel in the following areas: regulation and certification; security; safety; acquisition; commercial space; airports; administration; and administration staff.

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Planning Controller

A Planning Controller performs the following activities: Ensure separation; Initiate control instructions; Operate interphones; Conduct air/ground communications via data link; Coordinate tactical traffic flows; Scan flight data; Correlate with situation data; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the tactical controller when aware of those instructions.

Radar Associate Controller

A Radar Associate Controller performs the following activities: Ensure separation, initiate control instructions; operate interphones; Accept and initiate non-automated handoffs; and ensure radar controller is made aware of the actions; Assist the radar controller by accepting or initiating automated handoffs/pointouts which are necessary for the continued smooth operation of the sector, and ensure that the radar controller is made immediately aware of any action taken; Coordinate, including pointouts; Monitor radios when not performing higher priority duties; Scan flight progress strips; Correlate with radar data; Manage flight progress strips; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the radar controller when aware of those instructions.

Radar Controller

A Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate automated handoffs; Assist the radar associate controller with non-automated handoff actions when needed; Assist the radar associate controller in coordination when needed; Scan radar display; Correlate with flight progress strip information; Ensure computer entries are completed on instructions or clearances you issue or receive; Ensure strip marking is completed on instructions or clearances you issue or receive.

Radar Coordinator

A Radar Coordinator performs the following activities: Perform interfacility/ intrafacility/sector/controller coordination of traffic actions; Advise the radar controller and the radar associate controller of sector actions required to accomplish overall objectives; Perform any of the functions of the sector team which will assist in meeting situation objectives.

Rescue Coordination Center Specialist

Rescue Coordination Center People consist of personnel from the United States Coast Guard and the United States Air Force who receive information about overdue or missing aircraft from the FAA and coordinate the search and rescue activities within their respective regions.

Tactical Controller

A Tactical Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios and data link; Oversee data link communications by the associate tactical controller; Accept and initiate automated handoffs; Assist the planning controller with non-automated handoff actions when needed; Assist the planning controller in coordination when needed; Scan the situation display; Correlate with flight data; Ensure computer entries are completed on instructions or clearances you issue or receive.

Traffic Management Coordinators

Traffic Management Coordinators track and predict traffic flows, analyze ground delays, evaluate alternative routing strategies, and plan local traffic patterns at the local facility (ARTCC, TRACON, or Towers)

Traffic Management Specialist

Traffic Management Specialists perform the following activities: Balance air traffic demand with the airspace's capacity to maintain maximum and efficient utilization of the NAS; Coordinate and implement traffic management directives if needed for area of responsibility; Monitor and balance traffic flows within the area of responsibility in accordance with traffic management directives; Evaluate effectiveness of traffic management directives and make necessary adjustments; Document delay information.

Interfaces

Aeronautical Information Management — (Data Communication) ➔ Integrated Information Workstation - Build 1

AIM sends NOTAMS and other data to the IIW for display.

Surveillance Data Processor — (Surveillance Data) ➔ Standard Automation Platform Workstation Phase 1

The SDP sends surveillance data to the SAP WS for display to the controller.

Issues

Identifying the demand point at which the service in a track structure costs more in the terms of efficiency than the institution of increased surveillance, communication to mange the flow with radar-like procedures. Need to develop a concept of control that does not depend on the same domestic volumetric assignments or the cost of radar-like services will outweigh the flight efficacy benefits of flexibility.

Service Group Air Traffic Services

Service ATC-Separation Assurance

Capability Aircraft to Aircraft Separation Capability

Operational Improvement

Extend The Use Of Radar Separation Procedures To Non-Radar Airspace Using Alternative Sources Of Surveillance

(102123)

Integrating surveillance sources (primary, beacon, automatic dependent surveillance (ADS)) provides expanded separation services throughout the NAS. Increasing the separation assurance coverage area is based on the aircraft transmission of position, velocity, and intent information. Additional non-radar surveillance sources (ADS) for position data, increased aircraft equipage, and enhanced automation allow reduced separation criteria to be applied in more areas of the NAS.

30-Jun-2015 to 30-Jun-2024

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

This operational improvement expands en route Instrument Flying Rules separation assurance coverage areas in the National Airspace System (NAS) by integrating multiple surveillance sources of the en route centers and processing by the automation systems. Specifically, this improvement provides improved position data and implements radar separation procedures in formerly procedural airspace using automatic dependent surveillance (ADS) as the surveillance source (i.e., "radar-like" separation). The Surveillance Data Network (SDN) maintains and distributes surveillance data from these sources. Ground based transceivers provide ADS-broadcast data to the SDN for distribution. System Wide Information Management provides flight objects, including the surveillance data, associated with flight data. Surveillance, flight object data, and NAS status data are displayed for the controller on the Standard Automation Workstation. The result is expanded separation assurance coverage areas that include many formerly non radar areas such as parts of the Rocky Mountains. With ADS "radar-like" data available to properly equipped aircraft in previously non radar areas, better services are available to the user. The enhanced data permits application of radar-based techniques and services in airspace formerly without radar coverage. Improvements are especially noticeable in airspace previously constrained to 'one-in one-out' operations. The NAS is able to offer more services to pilots, including traffic advisories, minimum safe altitude warning system, navigational assistance, and enhanced search and rescue. Controllers have a reduced workload, and pilots have improved situational awareness of other air traffic in the area.

Benefits

Additional surveillance sources that extend coverage into previously non radar areas enhance safety by allowing controllers to provide radar-like separation services. Increased surveillance coverage allows controllers to eliminate non radar separation standards, permitting greater access to the NAS and increasing capacity. This operational improvement: Reduces the workload associated with maintaining aircraft position and separation procedurally, thus increasing the number of aircraft that can be worked by the controller. Reduces the separation requirement between equipped aircraft, thus permitting more aircraft into the volume airspace, which increases access and reduces flight inefficiency awaiting entry. Increases use of point-to-point clearances, which provides more efficient flight profiles.

Systems

Air Route Surveillance Radar - Model 1E

The Air Route Surveillance Radar - Model 1E (ARSR-1E) is a 1970s analog radar. It is a long-range radar system with a maximum detection range of 200 nm. The ARSR-1E is a surveillance system used to detect azimuth and slant range of en route aircraft operating between terminal areas. It also provides weather intensity data.

Air Route Surveillance Radar - Model 2

The Air Route Surveillance Radar - Model 2 (ARSR-2) is a 1970s analog radar. It is a long-range radar system with a maximum detection range of 200 nm. The ARSR-2 is a surveillance system used to detect azimuth and slant range of en route aircraft operating between terminal areas. It also provides weather intensity data.

Air Route Surveillance Radar - Model 3

The Air Route Surveillance Radar - Model 3 (ARSR-3) is a 1980s radar that provides primary long range surveillance data, including slant range and azimuth data. It processes the returns which includes demodulation, analog-to-digital conversion, moving target indicator function, sensitivity time control, range and azimuth gating, and digital target extraction - all of which are performed digitally (with the exception of the demodulation and analog-to-digital conversion). In addition, the ARSR-3 has a weather channel with associated processing to provide weather contour information in digital format.

Air Route Surveillance Radar - Model 4

The Air Route Surveillance Radar - Model 4 (ARSR-4) is a three-dimensional, long-range, rotating phased array, primary surveillance radar with integrated height finder capability. It is part of the joint surveillance system (JSS) used in conjunction with ARSR-3 coverage as part of the nationwide air defense command surveillance network. In addition to functions peculiar to the military, the ARSR-4 performs the same basic functions of the ARSR-3, by providing primary long-range surveillance data, including slant range and azimuth data.

Air Traffic Control Beacon Interrogator - Model 6

The Air Traffic Control Beacon Interrogator Model 6 (ATCBI-6) is a ground-based system that interrogates transponders, receives and processes replies from transponders, determines the range and azimuth to the aircraft, and forwards the information to appropriate air traffic control (ATC) automation systems. Replies provide identification and altitude data of the transponder.

Airport Surveillance Radar - Model 11

The Airport Surveillance Radar- Model 11 (ASR-11) is a digital, combined primary and secondary surveillance radar (SSR), short-range radar system with a 60 nautical mile (nmi) detection range for medium and small activity airports. The ASR-11 provides advanced digital primary radar including weather intensity surveillance with an integrated monopulse SSR system for use in the airport terminal area. The ASR-11 is used to detect and report the presence and location of an aircraft in a specific volume of airspace. The ASR-11 provides search radar surveillance coverage in controlled airspace primarily in terminal areas.

Airport Surveillance Radar - Model 7

The Airport Surveillance Radar - Model 7 (ASR-7) is a short-range (60 nm) analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the Air Traffic Control Beacon Interrogator - Model 4 or Model 5 (ATCBI-4 or ATCBI-5) or Mode S. This system will be replaced by the ASR-11.

Airport Surveillance Radar - Model 8

The Airport Surveillance Radar - Model 8 (ASR-8) is a short-range (60 nm), analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the Air Traffic Control Beacon Interrogator - Model 4 or Model 5 (ATCBI-4 or ATCBI-5) or Mode S.

Airport Surveillance Radar - Model 9

The Airport Surveillance Radar - Model 9 (ASR-9) is a short range (60 nm) radar system for the airport terminal area. The ASR-9 processes the returns from aircraft targets, which includes demodulation, analog-to-digital conversion, range and azimuth gating, sensitivity timing control, and a moving target detection function. The moving target detector includes two-level weather contour processing, digital signal processing, correlation and interpolation processing, and surveillance processing. The ASR-9 has a separate weather channel with associated processing capable of providing six-level weather contours. The two-level weather contour processing associated with the moving target detector is only be used for backup. The six-level weather channel is primarily used to supplement Next Generation Weather Radar (NEXRAD) coverage. It is normally used in conjunction with Mode Select (Mode S) but it can accommodate an Air Traffic Control Beacon Interrogator Model 4/5 (ATCBI-4/5).

The ASR-9 will be upgraded/replaced with the ASR-9/Mode S SLEP (see separate mechanism) in the 2007-12 time frame.

Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program)

The Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) (ASR-9/Mode S (SLEP)) mechanism provide the necessary technical refresh to extend the service life of the ASR-9 and Mode S through 2030. The ASTERIX upgrade has not been implemented, but will be implemented at a later date.

Automatic Dependent Surveillance (Capstone) Ground Station

The Automatic Dependent Surveillance (Capstone) Ground Station (ADS (Cap) Ground Station) is a demonstration system used by the Capstone project under Safe Flight 21. It receives Global Positioning System (GPS)-derived aircraft four (4)-dimensional position data, aircraft identification, aircraft velocity, and other selected aircraft data for processing at ATC facilities, and transmits Traffic Information System - Broadcast (TIS-B) information on aircraft in areas of radar coverage (and other airspace status information when available) to properly to equipped aircraft, to support operational trials. These ground stations are located in remote locations in Alaska, and feed the Anchorage Air Route Traffic Control Center (ARTCC) automation system.

Automatic Dependent Surveillance - Broadcast (Capstone) Avionics

Automatic Dependent Surveillance - Broadcast (Capstone) Avionics (ADS-B (Cap) Avionics) are the surveillance avionics used by the Capstone project under Safe Flight 21. These are demonstration avionics that are used to support ADS-B-related operational trials in Alaska.

Automatic Dependent Surveillance - Broadcast Avionics (key system)

Automatic Dependent Surveillance-Broadcast Avionics (ADS-B Avionics) transmits and receives Global Positioning System (GPS)-derived aircraft 4-dimensional position data, aircraft identification, aircraft velocity, and other selected aircraft data. Augmented GPS data may be required for certain applications. This is intended to be a surveillance system and not an avoidance system. The broadcast of own position is automatic and is intended to provide surveillance information to other users. The aircraft or vehicle originating the broadcast may not have knowledge of which users are receiving its broadcast. The ADS-B avionics are designed to transmit this 4-dimensional position data of own aircraft or vehicle and to also receive same type of information from others that are similarly equipped to receive and process ADS-B surveillance information.

BSGS Broadcast Services Ground Station (key system)

The BSGS (Broadcast Services Ground Station) supports Air-Ground broadcast services. This includes the reception of ADS-B from equipped aircraft/vehicles and the transmission of Traffic Information Service-Broadcast (TIS-B) and Flight Information Service-Broadcast (FIS-B) for use by equipped aircraft. Generally, the BSGS will interface via the SDN to provide ADS-B information to ATC automation and receive TIS-B and FIS-B information from TIS-B and FIS-B servers. The BSGS includes antenna(s), one or more dual link (i.e., 1090 MHz Extended Squitter-1090ES and Universal Access Transceiver-UAT) Ground Based Transceiver(s)(GBT), processing functions and communications functions. Several configurations of the BSGS are required to support variations in the geographic service volume and functions to be supported at specific categories of operational sites. BSGSs will be installed at 448 airports and 100 en route locations. Included are those airports equipped with Secondary Surveillance Radar (SSR) and about 140 additional towered airports (currently without SSR). The BSGS will support ADS-B and TIS-B services via both the 1090ES link and by the UAT link. The BSGS will also support FIS-B via the UAT link. BSGSs incorporate a multilink gateway function that provides ADS-B rebroadcasts via the ADS-B alternate link. A BSGS incorporating 2 GBTs are required for airport surface and terminal surveillance coverage at each of 268 smaller airports, a BSGS incorporating 3 GBTs (on average) are required at 120 of the mid-sized airports, and a BSGS incorporating 6 GBTs (on average) are required at the 60 largest airport (those equipped with ASDE-X or ASDE-3 surface surveillance systems).

The following BSGS functions are required to support the various categories of NAS BSGS sites, except as noted below: (1) 1090ES and UAT receive/transmit (i.e., the GBT funnction); (2) multi-link gateway function; (3) process received ADS-B messages and output (via the SDN) ADS-B reports for use by ATC automation; (4) accept TIS-B and FIS-B information from ground TIS-B/FIS-B servers and manage the generation and broadcast of link specific TIS-B messages via the 1090ES and UAT links and FIS-B messages via the UAT link.

The following BSGS configurations are assumed based on the category of the operational site. Except as noted below all BSGS configuration support the above described functions.

En route (100 sites): (1) One multi-sector antenna with each sector connected to the individual 1090ES and UAT receivers. Supports up to 250 nmi. ADS-B reception. En route locations that are intended to provide only low-altitude gap filler coverage do not require the long-range capability. (2) One omni-directional transmit antenna. Transmitter power sized to support the required TIS-B and FIS-B coverage for that specific site.

Terminal/Airport without ASDE-X (415 airports incl. 27 ASDE-3 equipped airports) with each site having: (1) BSGS with at least 2 GBTs with omni-directional antennas sited for both airport surface and terminal airspace coverage; (2) additional GBTs as needed to provide coverage of the primary airport surface movement area.

Terminal/Airport with ASDE-X (26 ASDE-X plus 7 upgraded ASDE-3 airports with an average of 6 GBTs per BSGS): (1) ASDE-X ground stations upgraded to support GBT functionality; (2) At least two of the GBTs provide ADS-B coverage to the edge of the terminal airspace and the TIS-B coverage; (3) ASDE provides the surveillance data source to support TIS-B for surface traffic.

Digital Airport Surveillance Radar

The Digital Airport Surveillance Radar (DASR) provides advanced digital primary radar including weather intensity surveillance with an integrated mono-pulse Secondary Surveillance Radar (SSR) system for use in the airport terminal area. (Military version of ASR-11)

Digital Voice Recorder System Replacement

The Digital Voice Recorder System Replacement (DVRS Replacement) is a modern digital system used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

En Route Next Generation Secondary Surveillance Radar

En Route Next Generation Secondary Surveillance Radar (En Route (NEXGEN SS-ER)) is a future generation surveillance system capable of providing cooperative surveillance capabilities commensurate with the technology at the time.

Enhanced Terminal Voice Switch (key system)

The Enhanced Terminal Voice Switches (ETVS) are installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) facilities with more than four air traffic controller positions. The ETVS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The ETVS (installed in the ATCT) provides the ATC operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the ETVS.

The ETVS (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within a TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the ETVS.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate ETVS systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Fixed Position Surveillance - Model 117

The Fixed Position Surveillance - Model 117 (FPS-117) radar is a joint-use military surveillance system used by the FAA to detect slant range and azimuth of en route aircraft. These radars are located in Alaska (12) and Hawaii (1), and are expected to be sustained until at least 2020.

Fixed Position Surveillance Model 20 Series

The Fixed Position Surveillance Model 20 Series (FPS-20 Series) is a military primary radar of various models (FPS-20A, FPS-64, FPS-66A, FPS-67/A/B, and ARSR-60M) used by the FAA to detect slant range and azimuth of en route aircraft operating between terminals in the continental United States. Each of the different radar models is a similar variation of the original FPS-20 military radar.

Flexible Voice Switch (key system)

Voice communications is the primary means of communications among ATC facilities and between an Air Traffic Control Specialist (ATCS) and a pilot. Voice switching provides the ATCS both G/G Interfacility/Intrafacility and A/G voice communications connectivity. The NAS Voice Switch (NVS) program will replace aging voice switches and their analog interfaces with modern digital voice switches consisting of digital interfaces. The Flexible Voice Switch will be the common platform and baseline voice switch for all NAS domains with modularity and scalability to meet communications connectivity requirements. Additionally, this switch will be expandable to accommodate growth capacity requirements and able to support NAS Modernization needs as described in various Operational Improvements.

Heating, Ventilation and Air Conditioning - Long-Range Radar

The Heating, Ventilation and Air Conditioning - Long-Range Radar (HVAC - LRR) mechanism provides the systems to maintain the temperature and relative humidity within the facility at acceptable levels for LRR system operation or personnel comfort as required. This includes filtering of air to Occupational Safety and Health Administration (OSHA) requirements.

High Frequency Airborne Radios

High Frequency (HF) Airborne Radios are analog (HF multi-channel radio transceivers operating in the 2 - 30 Mhz frequency band installed in airborne commercial, cargo, and military aircraft transiting the oceanic, en route, terminal, or flight service station airspace domains. These transceivers are typically used in transoceanic applications.

Low-Density Radio Communications Link

The Low-Density Radio Communications Link (LDRCL) is an FAA owned Low-Density Radio Communications Link (LDRCL) satisfies short-haul, low-density communication requirements. It provides user access (via tail circuits) to a Radio Communications Link (RCL) site or connectivity between two operational facilities

Multi-Mode Digital Radios

Multi-Mode Digital Radios (MDRs) are ground-based Very High Frequency (VHF) air-traffic-control radios that can operate in several configurations: 1) analog voice with 25kHz channel spacing; 2) analog voice with 8.33 kHz channel spacing; and 3) VHF Data Link (VDL) Mode-3 which consists of two-way digital voice and data communication.

New Terminal Radar

The New Terminal Radar (New Terminal Radar) replaces existing terminal radar systems with new radars that incorporates primary and secondary surveillance and Doppler weather radar capability.

Since ADS-B may be used in lieu of secondary surveillance at some locations, the New Terminal Radar will include just the primary surveillance and Doppler weather radar capabilities at those locations. The determination of these locations will depend on the outcome of ADS-B investment decisions, as yet TBD.

Radio Communication Link

Radio Communication Link (RCL) is an integrated voice and data microwave transmission system designed to provide the FAA with cost effective and reliable service for its high capacity NAS communications routes. RCL interconnects air route traffic control center (ARTCC) facilities with long range radar installations and other air traffic control (ATC) facilities.

Radio Control Equipment

Radio Control Equipment (RCE), located at both ATC facilities and remote communication sites, control the operation of remotely located ground to air Very High Frequency/Ultra High Frequency (VHF/UHF) radios used by air traffic controllers to communicate with pilots. RCE interfaces with the voice switch at the ATC facility, telephone landlines, and ground to air radios at the En Route Remote Communications Air/Ground (RCAG) sites, Terminal Remote Transmitter/Receiver (RTR) sites, and Flight Service Station Remote Communications Outlet (RCO) sites.

Satellite Communication Airborne Radios

The Satellite Communication (SATCOM) airborne radios are transceivers installed in commercial, cargo, and military aircraft transiting in the National Airspace System (NAS) and are used as an alternate means of voice communications between pilots in aircraft and ground controllers. These transceivers are typically used in transoceanic applications.

Satellite Communication Ground Radios

Satellite Communications (SATCOM) Ground Radios are transceivers installed at oceanic and en route facilities to support an alternative means of tactical air traffic control (ATC) voice communications between ground controllers and pilots in aircraft. These transceivers are typically used in transoceanic applications. These transceivers are also installed at regional facilities and used as an alternate means of communications in case of total ground communications failure or between locations in mountainous terrain or where other means of communications are not possible (e.g., Alaska).

Oceanic air to ground satellite communications are provided via a communications service provider. The FAA currently has no plans to develop or implement its own air to ground SATCOM ground radios.

Standard Automation Platform Convergence Phase 1 (key system)

The purpose of Standard Automation Platform Convergence Phase 1 (SAP Conv P1) is to reduce both procurement and recurring costs by standardizing and sharing as many hardware and software ATC Automation components as possible.

An engineering convergence task will begin in fiscal year 2005 and run through 2015. All components from each of the automation systems (STARS, ERAM, TFM, etc.) will be analyzed, and the "best of breed" and "core" components will be selected. SAP convergence will be performed in the following areas: (1) Hardware; (2) System Software (operating systems, Commercial-Off-The-Shelf tools, etc.); (3) ATC applications that can be shared across domains; (4) ATC applications that are unique to a domain; and (5) ATC system support tools that can be shared across domains (adaptation, data extraction or systems analysis recording, data reduction and analysis tools, etc.). Proven STARS and ERAM components will be slected, integrated into the SAP, and rigorously tested for replacing STARS and ERAM components at or near their end of service life.

Prototyping begun under Phase 1 will continue with SAP Conv P2. The results of both efforts will lead to refining the requirements to develop the SAP WS mechanism with SDP and FOMS applications.

Standard Automation Platform Convergence Phase 2

Standard Automation Platform Convergence Phase 2 (SAP Conv P2) continues with prototyping started under Phase 1 to insure that recurring and technical refresh costs for ATC automation elements are minimized by using as many common components as prossible.

SAP Phase 2 incorporates upgrades and technical refreshes of ATC applications, systems software, and hardware to ensure use of common elements across the terminal, enroute, oceanic, command center, and airport surface ATC Automation domains.

Prototyping will conclude with Phase 2, and the results will lead to refining the requirements for development of the SAP WS mechanism with SDP and FOMS applications.

Standard Automation Platform Workstation Phase 1 (key system)

The SAP consists of the Flight Object Management System (FOMS), the Surveillance Data Processor (SDP), and the SAP Workstation. The SAP will be installed in En Route and Arrival/Departure facilities. The SDP performs surveillance data processing and tracking on Surveillance Data Objects received from the Surveillance Data Network. The FOMS performs flight plan processing, associates flight and track data, and publishes the Flight Object on the System Wide Information Management network. The SAP workstation provides the controller interface for the FOMS and SDP.

Standard Automation Platform Workstation Phase 2

Provides a Technical Refresh of SAP Workstation Phase 1. The SAP consists of the Flight Object Management System (FOMS), the Surveillance Data Processor (SDP), and the SAP Workstation. The SAP will be installed in En Route and Arrival/Departure facilities. The SDP performs surveillance data processing and tracking on Surveillance Data Objects received from the Surveillance Data Network (SDN). The FOMS performs flight plan processing, associates flight and track data, and publishes the Flight Object on the System Wide Information Management network. The SAP workstation provides the controller interface for the FOMS and SDP.

Surveillance Data Network (key system)

National Airspace System (NAS) surveillance systems, including radar and automatic dependent surveillance systems will provide surveillance data objects via the Surveillance Data Network (SDN), which is a sub-network of the System Wide Information Management (SWIM) and the FAA Telecommunication Infrastructure (FTI). The published Surveillance Data Objects (SDO) will be made available to NAS and other users, including the Transportation Security Administration, Department of Defense, and others. Surveillance data availability supports 3-mile separation standards, gate-to-gate traffic management, seamless airspace, and dynamic resectorization. Improved surveillance information is provided in a timely and consistent manner seamlessly across the NAS for operations, planning, and decision making. The information will be available to all users and service providers via SDO in near real time. This information enables decisions to be based on a shared common view of situations, even as conditions are changing. Improved surveillance with SDOs will provide the automation higher quality of data for seamless surveillance and, in combination with other capabilities and new procedures, enable capacity and safety improvements. These benefits accrue from increased situation awareness by decision makers and improved operation of decision support and analysis tools that use surveillance information.

Surveillance Data Processor (key system)

SDP is a component of SAP and operates in En Route and Terminal. The SDP will make improvements to sensors and automation systems that will allow for expanded use of 3-mile separation and terminal procedures. The operational improvements enable more efficient control of aircraft and use of airspace. To accomplish this, all 1030/1090 Beacon interrogators will be upgraded to disseminate their existing 1.2 milli-radian azimuth accuracy and other information, such as time of measurement, confidence, quality, and so on. The automation system algorithms will be improved or new algorithms will be developed to exploit the additional information content of the improved surveillance reports. The method of presentation (display) to support 3-mile separation will be developed and tested to ensure safety. The existing long-range sensor surveillance update period is (12 seconds) and is insufficient to support 3-mile separation. In areas where only long-range sensors exist and where the Air Traffic Service requires 3-mile separation, these sensors may be modified to double the update rate to achieve 3-mile separation.

System Wide Information Management Build 1B (key system)

Build 1B provides all items in 1A, including more NAS information. This build integrates Flight and Surveillance Information systems into the SWIM architecture.

Ultra High Frequency Airborne Radios

The Ultra High Frequency Avionics (UHF Avionics) are analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225-400 MHz frequency band, which are multi-channel transceivers, installed in an airborne military platform. These airborne devices support the tactical two-way voice communications/ coordination between the military pilot in the military aircraft and the controller on the ground.

Ultra High Frequency Ground Radios

Ultra High Frequency (UHF) Ground Radios are analog UHF amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 Mhz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and flight service station domains.

Ultra High Frequency Ground Radios - Replacement

The Ultra High Frequency Ground Radios - Replacement (UHF Ground Radios - Repl) mechanism represents analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 MHz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and Flight Service Station domains.

Very High Frequency Ground Radios

Very High Frequency (VHF) Ground Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 MHz frequency band which are single-channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the pilot in commercial, cargo, or general aviation aircraft in the oceanic, en route (i.e., ARTCC), terminal (i.e., TRACON/tower), and flight service station domains. Additionally, there are analog VHF frequency modulation (VHF - FM) radio devices operating in the 161 - 174 MHz frequency band that are multi-channel transceivers. These transceivers are used by flight inspection, aviation security, and airway facility specialists supporting local airport operations and maintenance or to perform their operational maintenance mission in support of the NAS. However, these same VHF-FM transceivers are also used to support the resolution of emergency situations or establish a level of voice command and control communications/coordination during disaster recovery.

Very High Frequency Multi-Mode Airborne Radios

Very High Frequency Multi-Mode Airborne Radios (VHF MM Airborne Radios) refers to an airborne radio operating in the very high frequency (VHF) range capable of operating in the following modes: (1)) analog voice (i.e., 25 kHz spacing for use in the United States and other similarly equipped countries); (2) VHF Digital Link Mode 2 (VDL Mode-2) (two-way digital data transmission); (3) VHF Digital Link Mode 3 (VDL Mode-3), (integrated two-way digital voice/data transmission); and (4) analog voice (i.e., 8.33 kHz spacing for use in Europe and other similarly equipped countries).

Voice Switching and Control System

The Voice Switching and Control System (VSCS) is installed in the Air Route Traffic Control Center (ARTCC). The VSCS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The VSCS provides the Air Traffic Control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ARTCC (intercom), interconnectivity between controllers in separate ARTCCs (interphone), and interconnectivity between ARTCC controllers and Terminal Radar Approach Control (TRACON) controllers/Airport Traffic Control Tower (ATCT) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ARTCC controllers and pilots is also supported by the VSCS.

Support Activities

AT Procedure Development for Extend The Use Of Radar Separation Procedures To Non-Radar Airspace Using Alternative Sources Of Surveillance

Air Traffic Procedures document air traffic services and how they are implemented. The introduction of new systems, or changes to existing systems, may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

AT Training for Extend The Use Of Radar Separation Procedures To Non-Radar Airspace Using Alternative Sources Of Surveillance

Air Traffic (AT) training is provided to the AT workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AT Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

FAA Certification for Extend The Use Of Radar Separation Procedures To Non-Radar Airspace Using Alternative Sources Of Surveillance

FAA certification is an activity necessary to support people and systems in the delivery of NAS services. Avionics and associated systems are deemed to be critical to the safety of flight and must be certificated. In addition certain operators and service providers require to be certified such as pilots, dispatchers and others. Certification will generally begin 24 months prior to Initial Operating Capability, and be complete prior to receiving or giving service.

People

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Planning Controller

A Planning Controller performs the following activities: Ensure separation; Initiate control instructions; Operate interphones; Conduct air/ground communications via data link; Coordinate tactical traffic flows; Scan flight data; Correlate with situation data; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the tactical controller when aware of those instructions.

Radar Associate Controller

A Radar Associate Controller performs the following activities: Ensure separation, initiate control instructions; operate interphones; Accept and initiate non-automated handoffs; and ensure radar controller is made aware of the actions; Assist the radar controller by accepting or initiating automated handoffs/pointouts which are necessary for the continued smooth operation of the sector, and ensure that the radar controller is made immediately aware of any action taken; Coordinate, including pointouts; Monitor radios when not performing higher priority duties; Scan flight progress strips; Correlate with radar data; Manage flight progress strips; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the radar controller when aware of those instructions.

Radar Controller

A Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate automated handoffs; Assist the radar associate controller with non-automated handoff actions when needed; Assist the radar associate controller in coordination when needed; Scan radar display; Correlate with flight progress strip information; Ensure computer entries are completed on instructions or clearances you issue or receive; Ensure strip marking is completed on instructions or clearances you issue or receive.

Radar Coordinator

A Radar Coordinator performs the following activities: Perform interfacility/ intrafacility/sector/controller coordination of traffic actions; Advise the radar controller and the radar associate controller of sector actions required to accomplish overall objectives; Perform any of the functions of the sector team which will assist in meeting situation objectives.

Rescue Coordination Center Specialist

Rescue Coordination Center People consist of personnel from the United States Coast Guard and the United States Air Force who receive information about overdue or missing aircraft from the FAA and coordinate the search and rescue activities within their respective regions.

Tactical Controller

A Tactical Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios and data link; Oversee data link communications by the associate tactical controller; Accept and initiate automated handoffs; Assist the planning controller with non-automated handoff actions when needed; Assist the planning controller in coordination when needed; Scan the situation display; Correlate with flight data; Ensure computer entries are completed on instructions or clearances you issue or receive.

Traffic Management Specialist

Traffic Management Specialists perform the following activities: Balance air traffic demand with the airspace's capacity to maintain maximum and efficient utilization of the NAS; Coordinate and implement traffic management directives if needed for area of responsibility; Monitor and balance traffic flows within the area of responsibility in accordance with traffic management directives; Evaluate effectiveness of traffic management directives and make necessary adjustments; Document delay information.

Interfaces

Automatic Dependent Surveillance - Broadcast Avionics ⇐ (Target Data) ➔ Automatic Dependent Surveillance - Broadcast Avionics

Air-to-air ADS-B target data is exchanged between aircraft for use initially as a situation awareness enhancement. This capability will be expanded to other future applications, such as precision approach and landing and self separation.

Automatic Dependent Surveillance - Broadcast Avionics ⇐ (Target Data) ➔ BSGS Broadcast Services Ground Station

The GBT intercepts ADS-B transmissions from aircraft in the coverage area of the GBT. The GBT transmits ADS-B reports it receives down the UAT link back up the 1090 link and vice versa.

BSGS Broadcast Services Ground Station — (Weather Data) ➔ Automatic Dependent Surveillance - Broadcast Avionics

ADS-B Avionics (with weather application) can receive FIS weather products broadcasted by the BSGS via an ADS-B data link.

BSGS Broadcast Services Ground Station — (Surveillance Data) ➔ System Wide Information Management Build 1B

The GBT provides ADS-B reports to the SDN for distribution to automation systems and other authorized systems and user.

Enhanced Terminal Voice Switch ⇐ (Voice Communication) ➔ Enhanced Terminal Voice Switch

This interface enables ATC voice communication between controllers in same or different facilities.

Surveillance Data Processor — (Surveillance Data) ➔ BSGS Broadcast Services Ground Station

The SDP provides surveillance data for aircraft that are not responding to beacon interrogations or providing ADS-B reports to the GBT for transmission up both the UAT and 1090 links.

Surveillance Data Processor — (Surveillance Data) ➔ Standard Automation Platform Workstation Phase 1

The SDP sends surveillance data to the SAP WS for display to the controller.

System Wide Information Management Build 1B — (Flight Data) ➔ BSGS Broadcast Services Ground Station

FOMS provides the flight object to the GBT for transmission to aircraft via SWIM.

System Wide Information Management Build 1B — (NAS Status Data) ➔ BSGS Broadcast Services Ground Station

"The GBT receives NAS Status Data, including NOTAMS, via SWIM for broadcast to aircraft equipped with UAT communication equipment.

System Wide Information Management Build 1B — (Weather Data) ➔ Standard Automation Platform Workstation Phase 1

The SAP WS receives weather data from SWIM for display to controllers.

System Wide Information Management Build 1B — (Surveillance Data) ➔ Surveillance Data Processor

The SDN distributes surveillance data received from various sensors to NAS automation systems.

Issues

Equipage and the mix of procedural versus radar-like targets at the same altitudes and routings. Equity and policy on servicing equipped versus non-equipped to improve/ maximize flow and access.

Service Group Air Traffic Services

Service ATC-Separation Assurance

Capability Aircraft to Aircraft Separation Capability

Operational Improvement

Incorporate Aircraft Provided Intent Data to Improve Conflict Detection, Resolution Development and Monitoring
(102122)

Integrating surveillance sources (primary, beacon, automatic dependent surveillance) provides pilots expanded separation services throughout the NAS. Air traffic controllers equipped with aircraft position broadcast reports via automatic dependent surveillance receive velocity and intent data as well as position information. The addition of aircraft intent data enables the

controller to apply reduced separation minima in more areas of the NAS. Full collaborative decision making (CDM) capabilities and integrated decision support systems (DSSs) increase access to the NAS for equipped users, resulting in some exclusionary airspace.
31-Jan-2016 to 30-Jun-2024

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Resolution Development, and Monitoring Integrating surveillance sources (primary, beacon, and automatic dependent surveillance) provides pilots expanded separation services throughout the National Airspace System (NAS). Air traffic controllers equipped with aircraft position reports via automatic dependent surveillance broadcast(ADS-B) receive velocity and intent data as well as position information. Delivering velocity and next waypoint intent data reduces uncertainty in the future flight trajectory and thus reduces the probability that a potential conflict will be declared. When a potential conflict is identified, the resolution developed can be more precise, since delivery of intent data will reduce the time to identify non compliance with the resolution. This allows the controller to minimize monitoring for compliance buffer included in the resolution clearance. Automatic compliance testing using the delivery of the velocity vector on a rapid update cycle helps the controller to monitoring "identified potential conflicts", which allows the situation to evolve and actions taken only on those conflicts that persist.

The Surveillance Data Network (SDN) maintains and distributes surveillance data from these sources. Ground based transceivers provide ADS-B data to the SDN for distribution. System Wide Information Management provides flight objects, including the surveillance data, associated with flight data. Surveillance, flight object data, and NAS status data is displayed for the controller on the Standard Automation Platform Workstation. The addition of aircraft intent data enables the controller to apply reduced separation minima in more areas of the NAS. ADS gives the controller additional information to help project traffic and visualize future traffic conflict points.

Accurate aircraft position and velocity data, plus the added intent data, enables controllers to better determine future aircraft positions, which reduces uncertainty related to potential conflicts. Improved decision support tools help air traffic controllers predict potential conflicts and develop safe, effective resolutions. Full Collaborative Decision Making capabilities and an integrated decision support system increase access to the NAS for equipped users, resulting in some exclusionary airspace. Integrated information workstations provide controllers decision support information.

Benefits

Safety is enhanced through improved predictability by adding more accurate intent data from integrated surveillance sources. Improved intent data provides controllers more flexibility in approving user-requested routings, which will also contribute to increasing capacity. Incorporating intent data: Reduces the workload associated with conflict resolution development and monitoring, since the more accurate future trajectories reduce the number of potential conflicts identified, thus potentially increasing productivity/capacity. Reduces the monitoring and resolution workload by providing data to the Decision Support Tool to support continued monitoring of potential conflicts and responding only to those that persist in time. Improves the average flight efficiency, since fewer aircraft are moved proactively based on the potential of conflict.

Systems

Air Route Surveillance Radar - Model 1E

The Air Route Surveillance Radar - Model 1E (ARSR-1E) is a 1970s analog radar. It is a long-range radar system with a maximum detection range of 200 nm. The ARSR-1E is a surveillance system used to detect azimuth and slant range of en route aircraft operating between terminal areas. It also provides weather intensity data.

Air Route Surveillance Radar - Model 2

The Air Route Surveillance Radar - Model 2 (ARSR-2) is a 1970s analog radar. It is a long-range radar system with a maximum detection range of 200 nm. The ARSR-2 is a surveillance system used to detect azimuth and slant range of en route aircraft operating between terminal areas. It also provides weather intensity data.

Air Route Surveillance Radar - Model 3

The Air Route Surveillance Radar - Model 3 (ARSR-3) is a 1980s radar that provides primary long range surveillance data, including slant range and azimuth data. It processes the returns which includes demodulation, analog-to-digital conversion, moving target indicator function, sensitivity time control, range and azimuth gating, and digital target extraction - all of which are performed digitally (with the exception of the demodulation and analog-to-digital conversion). In addition, the ARSR-3 has a weather channel with associated processing to provide weather contour information in digital format.

Air Route Surveillance Radar - Model 4

The Air Route Surveillance Radar - Model 4 (ARSR-4) is a three-dimensional, long-range, rotating phased array, primary surveillance radar with integrated height finder capability. It is part of the joint surveillance system (JSS) used in conjunction with ARSR-3 coverage as part of the nationwide air defense command surveillance network. In addition to functions peculiar to the military, the ARSR-4 performs the same basic functions of the ARSR-3, by providing primary long-range surveillance data, including slant range and azimuth data.

Air Traffic Control Beacon Interrogator - Model 6

The Air Traffic Control Beacon Interrogator Model 6 (ATCBI-6) is a ground-based system that interrogates transponders, receives and processes replies from transponders, determines the range and azimuth to the aircraft, and forwards the information to appropriate air traffic control (ATC) automation systems. Replies provide identification and altitude data of the transponder.

Airport Surveillance Radar - Model 11

The Airport Surveillance Radar- Model 11 (ASR-11) is a digital, combined primary and secondary surveillance radar (SSR), short-range radar system with a 60 nautical mile (nmi) detection range for medium and small activity airports. The ASR-11 provides advanced digital primary radar including weather intensity surveillance with an integrated monopulse SSR system for use in the airport terminal area. The ASR-11 is used to detect and report the presence and location of an aircraft in a specific volume of airspace. The ASR-11 provides search radar surveillance coverage in controlled airspace primarily in terminal areas.

Airport Surveillance Radar - Model 7

The Airport Surveillance Radar - Model 7 (ASR-7) is a short-range (60 nm) analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the Air Traffic Control

Beacon Interrogator - Model 4 or Model 5 (ATCBI-4 or ATCBI-5) or Mode S. This system will be replaced by the ASR-11.

Airport Surveillance Radar - Model 8

The Airport Surveillance Radar - Model 8 (ASR-8) is a short-range (60 nm), analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the Air Traffic Control Beacon Interrogator - Model 4 or Model 5 (ATCBI-4 or ATCBI-5) or Mode S.

Airport Surveillance Radar - Model 9

The Airport Surveillance Radar - Model 9 (ASR-9) is a short range (60 nm) radar system for the airport terminal area. The ASR-9 processes the returns from aircraft targets, which includes demodulation, analog-to-digital conversion, range and azimuth gating, sensitivity timing control, and a moving target detection function. The moving target detector includes two-level weather contour processing, digital signal processing, correlation and interpolation processing, and surveillance processing. The ASR-9 has a separate weather channel with associated processing capable of providing six-level weather contours. The two-level weather contour processing associated with the moving target detector is only be used for backup. The six-level weather channel is primarily used to supplement Next Generation Weather Radar (NEXRAD) coverage. It is normally used in conjunction with Mode Select (Mode S) but it can accommodate an Air Traffic Control Beacon Interrogator Model 4/5 (ATCBI-4/5).

The ASR-9 will be upgraded/replaced with the ASR-9/Mode S SLEP (see separate mechanism) in the 2007-12 time frame.

Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program)

The Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) (ASR-9/Mode S (SLEP)) mechanism provide the necessary technical refresh to extend the service life of the ASR-9 and Mode S through 2030. The ASTERIX upgrade has not been implemented, but will be implemented at a later date.

Automatic Dependent Surveillance (Capstone) Ground Station

The Automatic Dependent Surveillance (Capstone) Ground Station (ADS (Cap) Ground Station) is a demonstration system used by the Capstone project under Safe Flight 21. It receives Global Positioning System (GPS)-derived aircraft four (4)-dimensional position data, aircraft identification, aircraft velocity, and other selected aircraft data for processing at ATC facilities, and transmits Traffic Information System - Broadcast (TIS-B) information on aircraft in areas of radar coverage (and other airspace status information when available) to properly to equipped aircraft, to support operational trials. These ground stations are located in remote locations in Alaska, and feed the Anchorage Air Route Traffic Control Center (ARTCC) automation system.

Automatic Dependent Surveillance - Broadcast Avionics (key system)

Automatic Dependent Surveillance-Broadcast Avionics (ADS-B Avionics) transmits and receives Global Positioning System (GPS)-derived aircraft 4-dimensional position data, aircraft identification, aircraft velocity, and other selected aircraft data. Augmented GPS data may be required for certain applications. This is intended to be a surveillance system and not an avoidance system. The broadcast of own position is automatic and is intended to provide surveillance information to other users. The aircraft or vehicle originating the broadcast may not have knowledge of which users are receiving its broadcast. The ADS-B avionics are designed to transmit this 4-dimensional position data of own aircraft or vehicle and to also receive same type of information from others that are similarly equipped to receive and process ADS-B surveillance information.

BSGS Broadcast Services Ground Station (key system)

The BSGS (Broadcast Services Ground Station) supports Air-Ground broadcast services. This includes the reception of ADS-B from equipped aircraft/vehicles and the transmission of Traffic Information Service-Broadcast (TIS-B) and Flight Information Service-Broadcast (FIS-B) for use by equipped aircraft. Generally, the BSGS will interface via the SDN to provide ADS-B information to ATC automation and receive TIS-B and FIS-B information from TIS-B and FIS-B servers. The BSGS includes antenna(s), one or more dual link (i.e., 1090 MHz Extended Squitter-1090ES and Universal Access Transceiver-UAT) Ground Based Transceiver(s)(GBT), processing functions and communications functions. Several configurations of the BSGS are required to support variations in the geographic service volume and functions to be supported at specific categories of operational sites. BSGSs will be installed at 448 airports and 100 en route locations. Included are those airports equipped with Secondary Surveillance Radar (SSR) and about 140 additional towered airports (currently without SSR). The BSGS will support ADS-B and TIS-B services via both the 1090ES link and by the UAT link. The BSGS will also support FIS-B via the UAT link. BSGSs incorporate a multilink gateway function that provides ADS-B rebroadcasts via the ADS-B alternate link. A BSGS incorporating 2 GBTs are required for airport surface and terminal surveillance coverage at each of 268 smaller airports, a BSGS incorporating 3 GBTs (on average) are required at 120 of the mid-sized airports, and a BSGS incorporating 6 GBTs (on average) are required at the 60 largest airport (those equipped with ASDE-X or ASDE-3 surface surveillance systems).

The following BSGS functions are required to support the various categories of NAS BSGS sites, except as noted below: (1) 1090ES and UAT receive/transmit (i.e., the GBT funnction); (2) multi-link gateway function; (3) process received ADS-B messages and output (via the SDN) ADS-B reports for use by ATC automation; (4) accept TIS-B and FIS-B information from ground TIS-B/FIS-B servers and manage the generation and broadcast of link specific TIS-B messages via the 1090ES and UAT links and FIS-B messages via the UAT link.

The following BSGS configurations are assumed based on the category of the operational site. Except as noted below all BSGS configuration support the above described functions.

En route (100 sites): (1) One multi-sector antenna with each sector connected to the individual 1090ES and UAT receivers. Supports up to 250 nmi. ADS-B reception. En route locations that are intended to provide only low-altitude gap filler coverage do not require the long-range capability. (2) One omni-directional transmit antenna. Transmitter power sized to support the required TIS-B and FIS-B coverage for that specific site.

Terminal/Airport without ASDE-X (415 airports incl. 27 ASDE-3 equipped airports) with each site having: (1) BSGS with at least 2 GBTs with omni-directional antennas sited for both airport surface and terminal airspace coverage; (2) additional GBTs as needed to provide coverage of the primary airport surface movement area.

Terminal/Airport with ASDE-X (26 ASDE-X plus 7 upgraded ASDE-3 airports with an average of 6 GBTs per BSGS): (1) ASDE-X ground stations upgraded to support GBT functionality; (2) At least two of the GBTs provide ADS-B coverage to the edge of the terminal airspace and the TIS-B coverage; (3) ASDE provides the surveillance data source to support TIS-B for surface traffic.

Digital Airport Surveillance Radar

The Digital Airport Surveillance Radar (DASR) provides advanced digital primary radar including weather intensity surveillance with an integrated mono-pulse Secondary Surveillance Radar (SSR) system for use in the airport terminal area. (Military version of ASR-11)

Digital Voice Recorder System Replacement

The Digital Voice Recorder System Replacement (DVRS Replacement) is a modern digital system used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

En Route Next Generation Secondary Surveillance Radar

En Route Next Generation Secondary Surveillance Radar (En Route (NEXGEN SS-ER)) is a future generation surveillance system capable of providing cooperative surveillance capabilities commensurate with the technology at the time.

Fixed Position Surveillance - Model 117

The Fixed Position Surveillance - Model 117 (FPS-117) radar is a joint-use military surveillance system used by the FAA to detect slant range and azimuth of en route aircraft. These radars are located in Alaska (12) and Hawaii (1), and are expected to be sustained until at least 2020.

Fixed Position Surveillance Model 20 Series

The Fixed Position Surveillance Model 20 Series (FPS-20 Series) is a military primary radar of various models (FPS-20A, FPS-64, FPS-66A, FPS-67/A/B, and ARSR-60M) used by the FAA to detect slant range and azimuth of en route aircraft operating between terminals in the continental United States. Each of the different radar models is a similar variation of the original FPS-20 military radar.

Flexible Voice Switch (key system)

Voice communications is the primary means of communications among ATC facilities and between an Air Traffic Control Specialist (ATCS) and a pilot. Voice switching provides the ATCS both G/G Interfacility/Intrafacility and A/G voice communications connectivity. The NAS Voice Switch (NVS) program will replace aging voice switches and their analog interfaces with modern digital voice switches consisting of digital interfaces. The Flexible Voice Switch will be the common platform and baseline voice switch for all NAS domains with modularity and scalability to meet communications connectivity requirements. Additionally, this switch will be expandable to accommodate growth capacity requirements and able to support NAS Modernization needs as described in various Operational Improvements.

Flight Object Management System - En Route (key system)

The FOMS is a component of the Standard Automation Platform (SAP). The FOMS processes flight data received from multiple sources via the System Wide Information Management (SWIM) Management Unit. The FOMS also receives track data from the Surveillance Data Processor and associates tracks with flight data, producing the flight object, which is published to SWIM for subscriber use. Flight plan support functionality includes end-to-end profile evaluation in all phases of flight and evaluation against static and dynamic constraints (terrain, obstacles, airspace restrictions, etc.). The FOMS supports flight planning up to 180 days prior to day of flight. A user can access the flight object from initial to closeout in the same manner. The FOMS provides end-to-end flight data management from preflight to post analysis. Ownership of the flight object begins and ends with Traffic Flow Management and transitions during the flight to clearance delivery, ramp, surface, departure, transition to cruise, cruise, transition to arrival, and ramp. Flight data management is based on trajectory, assigned volumes, and "necessary" route structure.

Heating, Ventilation and Air Conditioning - Long-Range Radar

The Heating, Ventilation and Air Conditioning - Long-Range Radar (HVAC - LRR) mechanism provides the systems to maintain the temperature and relative humidity within the facility at acceptable levels for LRR system operation or personnel comfort as required. This includes filtering of air to Occupational Safety and Health Administration (OSHA) requirements.

Integrated Information Workstation - Build 1 (key system)

IIW Build 1 will include the infrastructure and system interfaces to acquire, analyze, store, update, display, and manage the following information in an integrated manner: (1) National Airspace System (NAS) aeronautical, (2) airport environmental, (3) airborne and surface surveillance, (4) flight information, (5) weather information, and (6) NAS status. Build 1 will also replace its predecessor system, FAA Data Display System, as well as interface with the following systems in support of its mission: Flight Object Management, System Wide Information Management, Next Generation- Traffic Flow Management, Maintenance Management System, Unified Decision Management System, and Aeronautical Information Management.

Integrated Information Workstation - Build 2

Build 2 will incorporate new hardware technology and software enhancements through a technical refresh program.

Low-Density Radio Communications Link

The Low-Density Radio Communications Link (LDRCL) is an FAA owned Low-Density Radio Communications Link (LDRCL) satisfies short-haul, low-density communication requirements. It provides user access (via tail circuits) to a Radio Communications Link (RCL) site or connectivity between two operational facilities

Multi-Mode Digital Radios

Multi-Mode Digital Radios (MDRs) are ground-based Very High Frequency (VHF) air-traffic-control radios that can operate in several configurations: 1) analog voice with 25kHz channel spacing; 2) analog voice with 8.33 kHz channel spacing; and 3) VHF Data Link (VDL) Mode-3 which consists of two-way digital voice and data communication.

New Terminal Radar

The New Terminal Radar (New Terminal Radar) replaces existing terminal radar systems with new radars that incorporates primary and secondary surveillance and Doppler weather radar capability.

Since ADS-B may be used in lieu of secondary surveillance at some locations, the New Terminal Radar will include just the primary surveillance and Doppler weather radar capabilities at those locations. The determination of these locations will depend on the outcome of ADS-B investment decisions, as yet TBD.

Radio Communication Link

Radio Communication Link (RCL) is an integrated voice and data microwave transmission system designed to provide the

FAA with cost effective and reliable service for its high capacity NAS communications routes. RCL interconnects air route traffic control center (ARTCC) facilities with long range radar installations and other air traffic control (ATC) facilities.

Radio Control Equipment

Radio Control Equipment (RCE), located at both ATC facilities and remote communication sites, control the operation of remotely located ground to air Very High Frequency/Ultra High Frequency (VHF/UHF) radios used by air traffic controllers to communicate with pilots. RCE interfaces with the voice switch at the ATC facility, telephone landlines, and ground to air radios at the En Route Remote Communications Air/Ground (RCAG) sites, Terminal Remote Transmitter/Receiver (RTR) sites, and Flight Service Station Remote Communications Outlet (RCO) sites.

Satellite Communication Airborne Radios

The Satellite Communication (SATCOM) airborne radios are transceivers installed in commercial, cargo, and military aircraft transiting in the National Airspace System (NAS) and are used as an alternate means of voice communications between pilots in aircraft and ground controllers. These transceivers are typically used in transoceanic applications.

Standard Automation Platform Convergence Phase 1 (key system)

The purpose of Standard Automation Platform Convergence Phase 1 (SAP Conv P1) is to reduce both procurement and recurring costs by standardizing and sharing as many hardware and software ATC Automation components as possible.

An engineering convergence task will begin in fiscal year 2005 and run through 2015. All components from each of the automation systems (STARS, ERAM, TFM, etc.) will be analyzed, and the "best of breed" and "core" components will be selected. SAP convergence will be performed in the following areas: (1) Hardware; (2) System Software (operating systems, Commercial-Off-The-Shelf tools, etc.); (3) ATC applications that can be shared across domains; (4) ATC applications that are unique to a domain; and (5) ATC system support tools that can be shared across domains (adaptation, data extraction or systems analysis recording, data reduction and analysis tools, etc.). Proven STARS and ERAM components will be slected, integrated into the SAP, and rigorously tested for replacing STARS and ERAM components at or near their end of service life.

Prototyping begun under Phase 1 will continue with SAP Conv P2. The results of both efforts will lead to refining the requirements to develop the SAP WS mechanism with SDP and FOMS applications.

Standard Automation Platform Convergence Phase 2

Standard Automation Platform Convergence Phase 2 (SAP Conv P2) continues with prototyping started under Phase 1 to insure that recurring and technical refresh costs for ATC automation elements are minimized by using as many common components as prossible.

SAP Phase 2 incorporates upgrades and technical refreshes of ATC applications, systems software, and hardware to ensure use of common elements across the terminal, enroute, oceanic, command center, and airport surface ATC Automation domains.

Prototyping will conclude with Phase 2, and the results will lead to refining the requirements for development of the SAP WS mechanism with SDP and FOMS applications.

Standard Automation Platform Workstation Phase 1 (key system)

The SAP consists of the Flight Object Management System (FOMS), the Surveillance Data Processor (SDP), and the SAP Workstation. The SAP will be installed in En Route and Arrival/Departure facilities. The SDP performs surveillance data processing and tracking on Surveillance Data Objects received from the Surveillance Data Network. The FOMS performs flight plan processing, associates flight and track data, and publishes the Flight Object on the System Wide Information Management network. The SAP workstation provides the controller interface for the FOMS and SDP.

Standard Automation Platform Workstation Phase 2

Provides a Technical Refresh of SAP Workstation Phase 1. The SAP consists of the Flight Object Management System (FOMS), the Surveillance Data Processor (SDP), and the SAP Workstation. The SAP will be installed in En Route and Arrival/Departure facilities. The SDP performs surveillance data processing and tracking on Surveillance Data Objects received from the Surveillance Data Network (SDN). The FOMS performs flight plan processing, associates flight and track data, and publishes the Flight Object on the System Wide Information Management network. The SAP workstation provides the controller interface for the FOMS and SDP.

Surveillance Data Network (key system)

National Airspace System (NAS) surveillance systems, including radar and automatic dependent surveillance systems will provide surveillance data objects via the Surveillance Data Network (SDN), which is a sub-network of the System Wide Information Management (SWIM) and the FAA Telecommunication Infrastructure (FTI). The published Surveillance Data Objects (SDO) will be made available to NAS and other users, including the Transportation Security Administration, Department of Defense, and others. Surveillance data availability supports 3-mile separation standards, gate-to-gate traffic management, seamless airspace, and dynamic resectorization. Improved surveillance information is provided in a timely and consistent manner seamlessly across the NAS for operations, planning, and decision making. The information will be available to all users and service providers via SDO in near real time. This information enables decisions to be based on a shared common view of situations, even as conditions are changing. Improved surveillance with SDOs will provide the automation higher quality of data for seamless surveillance and, in combination with other capabilities and new procedures, enable capacity and safety improvements. These benefits accrue from increased situation awareness by decision makers and improved operation of decision support and analysis tools that use surveillance information.

Surveillance Data Processor (key system)

SDP is a component of SAP and operates in En Route and Terminal. The SDP will make improvements to sensors and automation systems that will allow for expanded use of 3-mile separation and terminal procedures. The operational improvements enable more efficient control of aircraft and use of airspace. To accomplish this, all 1030/1090 Beacon interrogators will be upgraded to disseminate their existing 1.2 milli-radian azimuth accuracy and other information, such as time of measurement, confidence, quality, and so on. The automation system algorithms will be improved or new algorithms will be developed to exploit the additional information content of the improved surveillance reports. The method of presentation (display) to support 3-mile separation will be developed and tested to ensure safety. The existing long-range sensor surveillance update period is (12 seconds) and is insufficient to support 3-mile separation. In areas where only long-range sensors exist and where the Air Traffic Service requires 3-mile separation, these sensors may be modified to double the update rate to achieve 3-mile separation.

System Wide Information Management Build 1B (key system)

Build 1B provides all items in 1A, including more NAS information. This build integrates Flight and Surveillance Information systems into the SWIM architecture.

Ultra High Frequency Airborne Radios

The Ultra High Frequency Avionics (UHF Avionics) are analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225-400 MHz frequency band, which are multi-channel transceivers, installed in an airborne military platform. These airborne devices support the tactical two-way voice communications/ coordination between the military pilot in the military aircraft and the controller on the ground.

Ultra High Frequency Ground Radios - Replacement

The Ultra High Frequency Ground Radios - Replacement (UHF Ground Radios - Repl) mechanism represents analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 MHz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and Flight Service Station domains.

Very High Frequency Ground Radios

Very High Frequency (VHF) Ground Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 MHz frequency band which are single-channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the pilot in commercial, cargo, or general aviation aircraft in the oceanic, en route (i.e., ARTCC), terminal (i.e., TRACON/tower), and flight service station domains. Additionally, there are analog VHF frequency modulation (VHF - FM) radio devices operating in the 161 - 174 MHz frequency band that are multi-channel transceivers. These transceivers are used by flight inspection, aviation security, and airway facility specialists supporting local airport operations and maintenance or to perform their operational maintenance mission in support of the NAS. However, these same VHF-FM transceivers are also used to support the resolution of emergency situations or establish a level of voice command and control communications/coordination during disaster recovery.

Voice Switching and Control System Modification (Technological Refresh) (key system)

The Tech Refresh for VSCS is a service life extension. The Tech Refresh encompasses workstation upgrade, video display monitor, control equipment power, VSCU supportability, control shelf power supply, and software development demonstration system expansion.

Support Activities

AT Procedure Development for Incorporate Aircraft Provided Intent Data to Improve Conflict Detection, Resolution Development and Monitoring

Air Traffic Procedures document air traffic services and how they are implemented. The introduction of new systems, or changes to existing systems, may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

AT Training for Incorporate Aircraft Provided Intent Data to Improve Conflict Detection, Resolution Development and Monitoring

Air Traffic (AT) training is provided to the AT workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AT Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

Non-FAA Pilot Procedure Development for Incorporate Aircraft Provided Intent Data to Improve Conflict Detection, Resolution Development and Monitoring

A number of NAS users document the way their activities are to be carried out. The introduction of new systems, or changes to existing systems may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development will generally begin once ATC procedures have been established and be complete by 90 days prior to Initial Operating Capability, in order to facilitate training.

Non-FAA Pilot Training for Incorporate Aircraft Provided Intent Data to Improve Conflict Detection, Resolution Development and Monitoring

Non-FAA Pilot Training is provided to educate pilots as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional pilot training. Training will generally begin 60 days prior to IOC and be complete within one year following Full Operating Capability.

People

Air Traffic Control Specialist

A person authorized to provide air traffic control services.

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Planning Controller

A Planning Controller performs the following activities: Ensure separation; Initiate control instructions; Operate interphones; Conduct air/ground communications via data link; Coordinate tactical traffic flows; Scan flight data; Correlate with situation data; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the tactical controller when aware of those instructions.

Radar Associate Controller

A Radar Associate Controller performs the following activities: Ensure separation, initiate control instructions; operate interphones; Accept and initiate non-automated handoffs; and ensure radar controller is made aware of the actions; Assist the radar controller by accepting or initiating automated handoffs/pointouts which are necessary for the continued smooth operation of the sector, and ensure that the radar controller is made immediately aware of any action taken; Coordinate, including pointouts; Monitor radios when not performing higher priority duties; Scan flight progress strips; Correlate with radar data; Manage flight progress strips; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the radar controller when aware of those instructions.

Radar Controller

A Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate automated handoffs; Assist the radar associate controller with non-automated handoff actions when needed; Assist the radar associate controller in coordination when needed; Scan radar display; Correlate with flight progress strip information; Ensure computer entries are completed on instructions or clearances you issue or receive; Ensure strip marking is completed on instructions or clearances you issue or receive.

Radar Coordinator

A Radar Coordinator performs the following activities: Perform interfacility/ intrafacility/sector/controller coordination of traffic actions; Advise the radar controller and the radar associate controller of sector actions required to accomplish overall objectives; Perform any of the functions of the sector team which will assist in meeting situation objectives.

Supervisory Air Traffic Control Specialist

The supervisor is responsible for overall facility operations during an assigned shift. Duties include ensuring adequate staffing for the operational situation, monitoring operational positions, and ensuring functions are performed in accordance with directives.

Tactical Controller

A Tactical Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios and data link; Oversee data link communications by the associate tactical controller; Accept and initiate automated handoffs; Assist the planning controller with non-automated handoff actions when needed; Assist the planning controller in coordination when needed; Scan the situation display; Correlate with flight data; Ensure computer entries are completed on instructions or clearances you issue or receive.

Traffic Management Coordinators

Traffic Management Coordinators track and predict traffic flows, analyze ground delays, evaluate alternative routing strategies, and plan local traffic patterns at the local facility (ARTCC, TRACON, or Towers)

Traffic Management Specialist

Traffic Management Specialists perform the following activities: Balance air traffic demand with the airspace's capacity to maintain maximum and efficient utilization of the NAS; Coordinate and implement traffic management directives if needed for area of responsibility; Monitor and balance traffic flows within the area of responsibility in accordance with traffic management directives; Evaluate effectiveness of traffic management directives and make necessary adjustments; Document delay information.

Interfaces

Automatic Dependent Surveillance - Broadcast Avionics ← (Target Data) → Automatic Dependent Surveillance - Broadcast Avionics

Air-to-air ADS-B target data is exchanged between aircraft for use initially as a situation awareness enhancement. This capability will be expanded to other future applications, such as precision approach and landing and self separation.

Automatic Dependent Surveillance - Broadcast Avionics ← (Target Data) → BSGS Broadcast Services Ground Station

The GBT intercepts ADS-B transmissions from aircraft in the coverage area of the GBT. The GBT transmits ADS-B reports it receives down the UAT link back up the 1090 link and vice versa.

BSGS Broadcast Services Ground Station — (Weather Data) → Automatic Dependent Surveillance - Broadcast Avionics

ADS-B Avionics (with weather application) can receive FIS weather products broadcasted by the BSGS via an ADS-B data link.

BSGS Broadcast Services Ground Station — (Surveillance Data) → System Wide Information Management Build 1B

The GBT provides ADS-B reports to the SDN for distribution to automation systems and other authorized systems and user.

Flight Object Management System - En Route — (Flight Data) → BSGS Broadcast Services Ground Station

FOMS sends flight data to the GBT for broadcast to aircraft.

Flight Object Management System - En Route ← (Data Communication) → Integrated Information Workstation - Build 1

FOMS sends traffic management decision support tool information to IIW. The IIW serves as the controller interface to the tools.

Flight Object Management System - En Route — (Flight Data) → Standard Automation Platform Workstation Phase 1

FOMS provides the flight object to the SAP WS Phase 1 for display to the controller.

Surveillance Data Processor — (Surveillance Data) → BSGS Broadcast Services Ground Station

The SDP provides surveillance data for aircraft that are not responding to beacon interrogations or providing ADS-B reports to the GBT for transmission up both the UAT and 1090 links.

Surveillance Data Processor — (Track Data) → Flight Object Management System - En Route

"SDP sends correlated surveillance data to FOMS for further processing, including association with flight data.

Surveillance Data Processor — (Surveillance Data) → Standard Automation Platform Workstation Phase 1

The SDP sends surveillance data to the SAP WS for display to the controller.

System Wide Information Management Build 1B — (Flight Data) → BSGS Broadcast Services Ground Station

FOMS provides the flight object to the GBT for transmission to aircraft via SWIM.

System Wide Information Management Build 1B — (NAS Status Data) → BSGS Broadcast Services Ground Station

"The GBT receives NAS Status Data, including NOTAMS, via SWIM for broadcast to aircraft equipped with UAT communication equipment.

System Wide Information Management Build 1B — (NAS Status Data) → Flight Object Management System - En Route

FOMS receives NAS status data via SWIM.

System Wide Information Management Build 1B — (Weather Data) → Flight Object Management System - En Route

FOMS receives weather products from GWP and other sources via SWIM.

System Wide Information Management Build 1B — (Weather Data) → Standard Automation Platform Workstation Phase 1

The SAP WS receives weather data from SWIM for display to controllers.

System Wide Information Management Build 1B — (Surveillance Data) → Surveillance Data Processor

The SDN distributes surveillance data received from various sensors to NAS automation systems.

Voice Switching and Control System Modification (Technological Refresh) ← (Voice Communication) → Voice Switching and Control System Modification (Technological Refresh)

This interface enables ATC voice communication between controllers in same or different facilities.

Issues

Need to develop a concept of use for and evaluate/validate the role of automation in conformance monitoring. Need to evaluate/validate the improvements in trajectory prediction that intent provides at the normal conflict detection prediction window. How much more accurate are the trajectories at 20, 15, 10 , 5 minutes?

Service Group Air Traffic Services

Service ATC-Separation Assurance

Capability Aircraft to Aircraft Separation Capability

Operational Improvement

Reduce Horizontal Separation Standards -3 Miles Everywhere- to Increase Capacity and Efficiency (102117)

Multiple surveillance sources (primary, beacon, and automatic dependent surveillance) and improved surveillance data processing provide accurate position, trajectory, and intent data for aircraft to aircraft separation. Integrating these sources and providing terminal area surveillance data to the en route center increases the surveillance coverage area and availability of 3-mile separation procedures throughout the NAS.

30-Jun-2015 to 31-Jul-2017

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

The increased accuracy of ground-based radars and satellite-based automatic dependant surveillance (ADS) provides controllers more precise aircraft position, trajectory, and intent data. Integration of multiple surveillance sources (primary, beacon, ADS) and improved surveillance data processing have expanded availability of separation services in the National Airspace System (NAS). The Surveillance Data Network (SDN) maintains and distributes surveillance data from these sources. Ground-based transceivers provide ADS-broadcast data to the SDN for distribution. System Wide Information Management provides flight objects, including the surveillance data, associated with flight data to the standard automation platform workstation. The additional surveillance coverage and the accuracy of flight information permit air traffic controllers to apply 3-mile separation minima throughout the NAS. The term "3 miles everywhere", referring to the expanded use of a 3-mile separation standard in the terminal and en route domains, is now a reality.

Benefits

Increased surveillance coverage permits greater access to the NAS, enhances safety, and provides controllers the capability to use 3-mile separation minima throughout the NAS. The reduced separation standard also increases capacity.

Systems

Air Route Surveillance Radar - Model 1E

The Air Route Surveillance Radar - Model 1E (ARSR-1E) is a 1970s analog radar. It is a long-range radar system with a maximum detection range of 200 nm. The ARSR-1E is a surveillance system used to detect azimuth and slant range of en route aircraft operating between terminal areas. It also provides weather intensity data.

Air Route Surveillance Radar - Model 2

The Air Route Surveillance Radar - Model 2 (ARSR-2) is a 1970s analog radar. It is a long-range radar system with a maximum detection range of 200 nm. The ARSR-2 is a surveillance system used to detect azimuth and slant range of en route aircraft operating between terminal areas. It also provides weather intensity data.

Air Route Surveillance Radar - Model 3

The Air Route Surveillance Radar - Model 3 (ARSR-3) is a 1980s radar that provides primary long range surveillance data, including slant range and azimuth data. It processes the returns which includes demodulation, analog-to-digital conversion, moving target indicator function, sensitivity time control, range and azimuth gating, and digital target extraction - all of which are performed digitally (with the exception of the demodulation and analog-to-digital conversion). In addition, the ARSR-3 has a weather channel with associated processing to provide weather contour information in digital format.

Air Route Surveillance Radar - Model 4

The Air Route Surveillance Radar - Model 4 (ARSR-4) is a three-dimensional, long-range, rotating phased array, primary surveillance radar with integrated height finder capability. It is part of the joint surveillance system (JSS) used in conjunction with ARSR-3 coverage as part of the nationwide air defense command surveillance network. In addition to functions peculiar to the military, the ARSR-4 performs the same basic functions of the ARSR-3, by providing primary long-range surveillance data, including slant range and azimuth data.

Air Traffic Control Beacon Interrogator - Model 6

The Air Traffic Control Beacon Interrogator Model 6 (ATCBI-6) is a ground-based system that interrogates transponders, receives and processes replies from transponders, determines the range and azimuth to the aircraft, and forwards the information to appropriate air traffic control (ATC) automation systems. Replies provide identification and altitude data of the transponder.

Airport Surveillance Radar - Model 11

The Airport Surveillance Radar- Model 11 (ASR-11) is a digital, combined primary and secondary surveillance radar (SSR), short-range radar system with a 60 nautical mile (nmi) detection range for medium and small activity airports. The ASR-11 provides advanced digital primary radar including weather intensity surveillance with an integrated monopulse SSR system for use in the airport terminal area. The ASR-11 is used to detect and report the presence and location of an aircraft in a specific volume of airspace. The ASR-11 provides search radar surveillance coverage in controlled airspace primarily in terminal areas.

Airport Surveillance Radar - Model 7

The Airport Surveillance Radar - Model 7 (ASR-7) is a short-range (60 nm) analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the Air Traffic Control Beacon Interrogator - Model 4 or Model 5 (ATCBI-4 or ATCBI-5) or Mode S. This system will be replaced by the ASR-11.

Airport Surveillance Radar - Model 8

The Airport Surveillance Radar - Model 8 (ASR-8) is a short-range (60 nm), analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the Air Traffic Control Beacon Interrogator - Model 4 or Model 5 (ATCBI-4 or ATCBI-5) or Mode S.

Airport Surveillance Radar - Model 9

The Airport Surveillance Radar - Model 9 (ASR-9) is a short range (60 nm) radar system for the airport terminal area. The ASR-9 processes the returns from aircraft targets, which includes demodulation, analog-to-digital conversion, range and azimuth gating, sensitivity timing control, and a moving target detection function. The moving target detector includes two-level weather contour processing, digital signal processing, correlation and interpolation processing, and surveillance processing. The ASR-9 has a separate weather channel with associated processing capable of providing six-level weather contours. The two-level weather contour processing associated with the moving target detector is only be used for backup. The six-level weather channel is primarily used to supplement Next Generation Weather Radar (NEXRAD) coverage. It is normally used in conjunction with Mode Select (Mode S) but it can accommodate an Air Traffic Control Beacon Interrogator Model 4/5 (ATCBI-4/5).

The ASR-9 will be upgraded/replaced with the ASR-9/Mode S SLEP (see separate mechanism) in the 2007-12 time frame.

Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program)

The Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) (ASR-9/Mode S (SLEP)) mechanism provide the necessary technical refresh to extend the service life of the ASR-9 and Mode S through 2030. The ASTERIX upgrade has not been implemented, but will be implemented at a later date.

Automatic Dependent Surveillance (Capstone) Ground Station

The Automatic Dependent Surveillance (Capstone) Ground Station (ADS (Cap) Ground Station) is a demonstration system used by the Capstone project under Safe Flight 21. It receives Global Positioning System (GPS)-derived aircraft four (4)-dimensional position data, aircraft identification, aircraft velocity, and other selected aircraft data for processing at ATC facilities, and transmits Traffic Information System - Broadcast (TIS-B) information on aircraft in areas of radar coverage (and other airspace status information when available) to properly to equipped aircraft, to support operational trials. These ground stations are located in remote locations in Alaska, and feed the Anchorage Air Route Traffic Control Center (ARTCC) automation system.

Automatic Dependent Surveillance - Broadcast (Capstone) Avionics

Automatic Dependent Surveillance - Broadcast (Capstone) Avionics (ADS-B (Cap) Avionics) are the surveillance avionics used by the Capstone project under Safe Flight 21. These are demonstration avionics that are used to support ADS-B-related operational trials in Alaska.

Automatic Dependent Surveillance - Broadcast Avionics (key system)

Automatic Dependent Surveillance-Broadcast Avionics (ADS-B Avionics) transmits and receives Global Positioning System (GPS)-derived aircraft 4-dimensional position data, aircraft identification, aircraft velocity, and other selected aircraft data. Augmented GPS data may be required for certain applications. This is intended to be a surveillance system and not an avoidance system. The broadcast of own position is automatic and is intended to provide surveillance information to other users. The aircraft or vehicle originating the broadcast may not have knowledge of which users are receiving its broadcast. The ADS-B avionics are designed to transmit this 4-dimensional position data of own aircraft or vehicle and to also receive same type of information from others that are similarly equipped to receive and process ADS-B surveillance information.

BSGS Broadcast Services Ground Station (key system)

The BSGS (Broadcast Services Ground Station) supports Air-Ground broadcast services. This includes the reception of ADS-B from equipped aircraft/vehicles and the transmission of Traffic Information Service-Broadcast (TIS-B) and Flight Information Service-Broadcast (FIS-B) for use by equipped aircraft. Generally, the BSGS will interface via the SDN to provide ADS-B information to ATC automation and receive TIS-B and FIS-B information from TIS-B and FIS-B servers. The BSGS includes antenna(s), one or more dual link (i.e., 1090 MHz Extended Squitter-1090ES and Universal Access Transceiver-UAT) Ground Based Transceiver(s)(GBT), processing functions and communications functions. Several configurations of the BSGS are required to support variations in the geographic service volume and functions to be supported at specific categories of operational sites. BSGSs will be installed at 448 airports and 100 en route locations. Included are those airports equipped with Secondary Surveillance Radar (SSR) and about 140 additional towered airports (currently without SSR). The BSGS will support ADS-B and TIS-B services via both the 1090ES link and by the UAT link. The BSGS will also support FIS-B via the UAT link. BSGSs incorporate a multilink gateway function that provides ADS-B rebroadcasts via the ADS-B alternate link. A BSGS incorporating 2 GBTs are required for airport surface and terminal surveillance coverage at each of 268 smaller airports, a BSGS incorporating 3 GBTs (on average) are required at 120 of the mid-sized airports, and a BSGS incorporating 6 GBTs (on average) are required at the 60 largest airport (those equipped with ASDE-X or ASDE-3 surface surveillance systems).

The following BSGS functions are required to support the various categories of NAS BSGS sites, except as noted below: (1) 1090ES and UAT receive/transmit (i.e., the GBT funnction); (2) multi-link gateway function; (3) process received ADS-B messages and output (via the SDN) ADS-B reports for use by ATC automation; (4) accept TIS-B and FIS-B information from ground TIS-B/FIS-B servers and manage the generation and broadcast of link specific TIS-B messages via the 1090ES and UAT links and FIS-B messages via the UAT link.

The following BSGS configurations are assumed based on the category of the operational site. Except as noted below all BSGS configuration support the above described functions.

En route (100 sites): (1) One multi-sector antenna with each sector connected to the individual 1090ES and UAT receivers. Supports up to 250 nmi. ADS-B reception. En route locations that are intended to provide only low-altitude gap filler coverage do not require the long-range capability. (2) One omni-directional transmit antenna. Transmitter power sized to support the required TIS-B and FIS-B coverage for that specific site.

Terminal/Airport without ASDE-X (415 airports incl. 27 ASDE-3 equipped airports) with each site having: (1) BSGS with at least 2 GBTs with omni-directional antennas sited for both airport surface and terminal airspace coverage; (2) additional GBTs as needed to provide coverage of the primary airport surface movement area.

Terminal/Airport with ASDE-X (26 ASDE-X plus 7 upgraded ASDE-3 airports with an average of 6 GBTs per BSGS): (1) ASDE-X ground stations upgraded to support GBT functionality; (2) At least two of the GBTs provide ADS-B coverage to the edge of the terminal airspace and the TIS-B coverage; (3) ASDE provides the surveillance data source to support TIS-B for surface traffic.

Digital Airport Surveillance Radar

The Digital Airport Surveillance Radar (DASR) provides advanced digital primary radar including weather intensity surveillance with an integrated mono-pulse Secondary Surveillance Radar (SSR) system for use in the airport terminal area. (Military version of ASR-11)

Digital Voice Recorder System Replacement

The Digital Voice Recorder System Replacement (DVRS Replacement) is a modern digital system used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

Direct Access Radar Channel

The Direct Access Radar Channel (DARC) provides a back-up processing path to provide surveillance data to the displays in the event of a primary channel (Host Computer System (HCS) failure. The DARC path is a physically, logically and electrically separate processing path (with diverse hardware and software) from the primary Host Computer System (HCS) Radar Data Processing (RDP) paths. Thus DARC provides a tertiary path, to keep radar data on the controller"s displays, should both HCS RDP paths be disabled for any reason. The DARC provides radar data processing, very limited flight data processing, but with significantly less functionality than the HCS. Basically, DARC serves as a lifeboat should both HCS processing paths become disabled.

Display System Replacement (key system)

The Display System Replacement (DSR) provides continuous real-time, automated support to air traffic controllers for the display of surveillance, flight data and other critical control information. This information is processed by the Host and Oceanic Computer System Replacement (HOCSR) and the Enhanced Direct Access Radar Channel (EDARC) subsystems. The DSR provides controller workstations, displays, and input/output devices and a communications infrastructure to connect the DSR with external processing elements of the en route ATC automation system.

En Route Next Generation Secondary Surveillance Radar

En Route Next Generation Secondary Surveillance Radar (En Route (NEXGEN SS-ER)) is a future generation surveillance system capable of providing cooperative surveillance capabilities commensurate with the technology at the time.

Enhanced Terminal Voice Switch (key system)

The Enhanced Terminal Voice Switches (ETVS) are installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) facilities with more than four air traffic controller positions. The ETVS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The ETVS (installed in the ATCT) provides the ATC operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the ETVS.

The ETVS (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within a TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the ETVS.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate ETVS systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Fixed Position Surveillance - Model 117

The Fixed Position Surveillance - Model 117 (FPS-117) radar is a joint-use military surveillance system used by the FAA to detect slant range and azimuth of en route aircraft. These radars are located in Alaska (12) and Hawaii (1), and are expected to be sustained until at least 2020.

Fixed Position Surveillance Model 20 Series

The Fixed Position Surveillance Model 20 Series (FPS-20 Series) is a military primary radar of various models (FPS-20A, FPS-64, FPS-66A, FPS-67/A/B, and ARSR-60M) used by the FAA to detect slant range and azimuth of en route aircraft operating between terminals in the continental United States. Each of the different radar models is a similar variation of the original FPS-20 military radar.

Flexible Voice Switch (key system)

Voice communications is the primary means of communications among ATC facilities and between an Air Traffic Control Specialist (ATCS) and a pilot. Voice switching provides the ATCS both G/G Interfacility/Intrafacility and A/G voice communications connectivity. The NAS Voice Switch (NVS) program will replace aging voice switches and their analog interfaces with modern digital voice switches consisting of digital interfaces. The Flexible Voice Switch will be the common platform and baseline voice switch for all NAS domains with modularity and scalability to meet communications connectivity requirements. Additionally, this switch will be expandable to accommodate growth capacity requirements and able to support NAS Modernization needs as described in various Operational Improvements.

Heating, Ventilation and Air Conditioning - Long-Range Radar

The Heating, Ventilation and Air Conditioning - Long-Range Radar (HVAC - LRR) mechanism provides the systems to maintain the temperature and relative humidity within the facility at acceptable levels for LRR system operation or personnel comfort as required. This includes filtering of air to Occupational Safety and Health Administration (OSHA) requirements.

High Frequency Airborne Radios

High Frequency (HF) Airborne Radios are analog (HF multi-channel radio transceivers operating in the 2 - 30 Mhz frequency band installed in airborne commercial, cargo, and military aircraft transiting the oceanic, en route, terminal, or flight service station airspace domains. These transceivers are typically used in transoceanic applications.

Host Computer System

The Host Computer System (HCS) receives and processes surveillance reports, and flight plan information. The HCS sends search/beacon target, track and flight data, surveillance and alphanumeric weather information, time data, traffic management advisories and lists to the (Display System Replacement) DSR. The HCS associates surveillance-derived tracking information with flight-planning information. The DSR sends requests for flight data, flight data updates, and track control messages to the HCS. HCS-generated display orders are translated for use within the DSR workstation. While radar data processing is distributed among the terminal and En Route computer resources, the HCS performs virtually all of the flight data processing for its entire geographical area of responsibility. Every tower (ATCT) and terminal radar approach control (TRACON) relies exclusively on its parent HCS for flight data.

The HCS also runs algorithms that perform aircraft to aircraft (conflict alert) and aircraft to terrain (Minimum Safe Altitude Warning) separation assurance. The HCS algorithms provide visual and audible alerting to the controller when conflicts are identified.

The HCS presently supplies real time surveillance, flight data and other information to several decision support tools housed in collocated outboard processors connected via two-way high bandwidth links to the HCS and DSR. These are the (User Request Evaluation Tool, (URET), and the Traffic Management Advisory (TMA. URET performs probing of tentative flight plan changes to determine their viability. TMA provides sequencing and spacing information to align the aircraft in En Route airspace for approach.

Low-Density Radio Communications Link

The Low-Density Radio Communications Link (LDRCL) is an FAA owned Low-Density Radio Communications Link (LDRCL) satisfies short-haul, low-density communication requirements. It provides user access (via tail circuits) to a Radio Communications Link (RCL) site or connectivity between two operational facilities

Multi-Mode Digital Radios

Multi-Mode Digital Radios (MDRs) are ground-based Very High Frequency (VHF) air-traffic-control radios that can operate in several configurations: 1) analog voice with 25kHz channel spacing; 2) analog voice with 8.33 kHz channel spacing; and 3) VHF Data Link (VDL) Mode-3 which consists of two-way digital voice and data communication.

New Terminal Radar

The New Terminal Radar (New Terminal Radar) replaces existing terminal radar systems with new radars that incorporates primary and secondary surveillance and Doppler weather radar capability.

Since ADS-B may be used in lieu of secondary surveillance at some locations, the New Terminal Radar will include just the primary surveillance and Doppler weather radar capabilities at those locations. The determination of these locations will depend on the outcome of ADS-B investment decisions, as yet TBD.

Peripheral Adapter Module Replacement Item

The Peripheral Adapter Module Replacement Item (PAMRI) is an interface peripheral to the HOCSR. It provides a conduit through which the HOCSR receives and exchanges data, primarily radar data, flight data and interfacility data. The PAMRI converts communication protocols and translates data formats so the Host and EDARC can communicate with external devices.

Radio Communication Link

Radio Communication Link (RCL) is an integrated voice and data microwave transmission system designed to provide the FAA with cost effective and reliable service for its high capacity NAS communications routes. RCL interconnects air route traffic control center (ARTCC) facilities with long range radar installations and other air traffic control (ATC) facilities.

Radio Control Equipment

Radio Control Equipment (RCE), located at both ATC facilities and remote communication sites, control the operation of remotely located ground to air Very High Frequency/Ultra High Frequency (VHF/UHF) radios used by air traffic controllers to communicate with pilots. RCE interfaces with the voice switch at the ATC facility, telephone landlines, and ground to air radios at the En Route Remote Communications Air/Ground (RCAG) sites, Terminal Remote Transmitter/Receiver (RTR) sites, and Flight Service Station Remote Communications Outlet (RCO) sites.

Satellite Communication Airborne Radios

The Satellite Communication (SATCOM) airborne radios are transceivers installed in commercial, cargo, and military aircraft transiting in the National Airspace System (NAS) and are used as an alternate means of voice communications between pilots in aircraft and ground controllers. These transceivers are typically used in transoceanic applications.

Satellite Communication Ground Radios

Satellite Communications (SATCOM) Ground Radios are transceivers installed at oceanic and en route facilities to support an alternative means of tactical air traffic control (ATC) voice communications between ground controllers and pilots in aircraft. These transceivers are typically used in transoceanic applications. These transceivers are also installed at regional facilities and used as an alternate means of communications in case of total ground communications failure or between locations in mountainous terrain or where other means of communications are not possible (e.g., Alaska).

Oceanic air to ground satellite communications are provided via a communications service provider. The FAA currently has no plans to develop or implement its own air to ground SATCOM ground radios.

Standard Automation Platform Convergence Phase 1

The purpose of Standard Automation Platform Convergence Phase 1 (SAP Conv P1) is to reduce both procurement and recurring costs by standardizing and sharing as many hardware and software ATC Automation components as possible.

An engineering convergence task will begin in fiscal year 2005 and run through 2015. All components from each of the automation systems (STARS, ERAM, TFM, etc.) will be analyzed, and the "best of breed" and "core" components will be selected. SAP convergence will be performed in the following areas: (1) Hardware; (2) System Software (operating systems, Commercial-Off-The-Shelf tools, etc.); (3) ATC applications that can be shared across domains; (4) ATC applications that are unique to a domain; and (5) ATC system support tools that can be shared across domains (adaptation, data extraction or systems analysis recording, data reduction and analysis tools, etc.). Proven STARS and ERAM components will be slected, integrated into the SAP, and rigorously tested for replacing STARS and ERAM components at or near their end of service life.

Prototyping begun under Phase 1 will continue with SAP Conv P2. The results of both efforts will lead to refining the requirements to develop the SAP WS mechanism with SDP and FOMS applications.

Standard Automation Platform Convergence Phase 2

Standard Automation Platform Convergence Phase 2 (SAP Conv P2) continues with prototyping started under Phase 1 to insure that recurring and technical refresh costs for ATC automation elements are minimized by using as many common components as prossible.

SAP Phase 2 incorporates upgrades and technical refreshes of ATC applications, systems software, and hardware to ensure use of common elements across the terminal, enroute, oceanic, command center, and airport surface ATC Automation domains.

Prototyping will conclude with Phase 2, and the results will lead to refining the requirements for development of the SAP WS mechanism with SDP and FOMS applications.

Standard Automation Platform Workstation Phase 1

The SAP consists of the Flight Object Management System (FOMS), the Surveillance Data Processor (SDP), and the SAP Workstation. The SAP will be installed in En Route and Arrival/Departure facilities. The SDP performs surveillance data processing and tracking on Surveillance Data Objects received from the Surveillance Data Network. The FOMS performs flight plan processing, associates flight and track data, and publishes the Flight Object on the System Wide Information Management network. The SAP workstation provides the controller interface for the FOMS and SDP.

Standard Automation Platform Workstation Phase 2

Provides a Technical Refresh of SAP Workstation Phase 1. The SAP consists of the Flight Object Management System (FOMS), the Surveillance Data Processor (SDP), and the SAP Workstation. The SAP will be installed in En Route and Arrival/Departure facilities. The SDP performs surveillance data processing and tracking on Surveillance Data Objects received from the Surveillance Data Network (SDN). The FOMS performs flight plan processing, associates flight and track data, and publishes the Flight Object on the System Wide Information Management network. The SAP workstation provides the controller interface for the FOMS and SDP.

Surveillance Data Network (key system)

National Airspace System (NAS) surveillance systems, including radar and automatic dependent surveillance systems will provide surveillance data objects via the Surveillance Data Network (SDN), which is a sub-network of the System Wide Information Management (SWIM) and the FAA Telecommunication Infrastructure (FTI). The published Surveillance Data Objects (SDO) will be made available to NAS and other users, including the Transportation Security Administration, Department of Defense, and others. Surveillance data availability supports 3-mile separation standards, gate-to-gate traffic management, seamless airspace, and dynamic resectorization. Improved surveillance information is provided in a timely and consistent manner seamlessly across the NAS for operations, planning, and decision making. The information will be available to all users and service providers via SDO in near real time. This information enables decisions to be based on a shared common view of situations, even as conditions are changing. Improved surveillance with SDOs will provide the automation higher quality of data for seamless surveillance and, in combination with other capabilities and new procedures, enable capacity and safety improvements. These benefits accrue from increased situation awareness by decision makers and improved operation of decision support and analysis tools that use surveillance information.

Surveillance Data Processor (key system)

SDP is a component of SAP and operates in En Route and Terminal. The SDP will make improvements to sensors and automation systems that will allow for expanded use of 3-mile separation and terminal procedures. The operational improvements enable more efficient control of aircraft and use of airspace. To accomplish this, all 1030/1090 Beacon interrogators will be upgraded to disseminate their existing 1.2 milli-radian azimuth accuracy and other information, such as time of measurement, confidence, quality, and so on. The automation system algorithms will be improved or new algorithms will be developed to exploit the additional information content of the improved surveillance reports. The method of presentation (display) to support 3-mile separation will be developed and tested to ensure safety. The existing long-range sensor surveillance update period is (12 seconds) and is insufficient to support 3-mile separation. In areas where only long-range sensors exist and where the Air Traffic Service requires 3-mile separation, these sensors may be modified to double the update rate to achieve 3-mile separation.

System Wide Information Management Build 1B

Build 1B provides all items in 1A, including more NAS information. This build integrates Flight and Surveillance Information systems into the SWIM architecture.

Ultra High Frequency Airborne Radios

The Ultra High Frequency Avionics (UHF Avionics) are analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225-400 MHz frequency band, which are multi-channel transceivers, installed in an airborne military platform. These airborne devices support the tactical two-way voice communications/ coordination between the military pilot in the military aircraft and the controller on the ground.

Ultra High Frequency Ground Radios

Ultra High Frequency (UHF) Ground Radios are analog UHF amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 Mhz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and flight service station domains.

Ultra High Frequency Ground Radios - Replacement

The Ultra High Frequency Ground Radios - Replacement (UHF Ground Radios - Repl) mechanism represents analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 MHz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and Flight Service Station domains.

Very High Frequency Ground Radios

Very High Frequency (VHF) Ground Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 MHz frequency band which are single-channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the pilot in commercial, cargo, or general aviation aircraft in the oceanic, en route (i.e., ARTCC), terminal (i.e., TRACON/tower), and flight service station domains. Additionally, there are analog VHF frequency modulation (VHF - FM) radio devices operating in the 161 - 174 MHz frequency band that are multi-channel transceivers. These transceivers are used by flight inspection, aviation security, and airway facility specialists supporting local airport operations and maintenance or to perform their operational maintenance mission in support of the NAS. However, these same VHF-FM transceivers are also used to support the resolution of emergency situations or establish a level of voice command and control communications/coordination during disaster recovery.

Very High Frequency Multi-Mode Airborne Radios

Very High Frequency Multi-Mode Airborne Radios (VHF MM Airborne Radios) refers to an airborne radio operating in the very high frequency (VHF) range capable of operating in the following modes: (1)) analog voice (i.e., 25 kHz spacing for use in the United States and other similarly equipped countries); (2) VHF Digital Link Mode 2 (VDL Mode-2) (two-way digital data transmission); (3) VHF Digital Link Mode 3 (VDL Mode-3), (integrated two-way digital voice/data transmission); and (4) analog voice (i.e., 8.33 kHz spacing for use in Europe and other similarly equipped countries).

Voice Switching and Control System

The Voice Switching and Control System (VSCS) is installed in the Air Route Traffic Control Center (ARTCC). The VSCS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The VSCS provides the Air Traffic Control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ARTCC (intercom), interconnectivity between controllers in separate ARTCCs (interphone), and interconnectivity between ARTCC controllers and Terminal Radar Approach Control (TRACON) controllers/Airport Traffic Control Tower (ATCT) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ARTCC controllers and pilots is also supported by the VSCS.

Voice Switching and Control System Modification (Technological Refresh) (key system)

The Tech Refresh for VSCS is a service life extension. The Tech Refresh encompasses workstation upgrade, video display monitor, control equipment power, VSCU supportability, control shelf power supply, and software development demonstration system expansion.

Support Activities

AT Procedure Development for Reduce Horizontal Separation Standards - "3 Miles Everywhere" - to Increase Capacity and Efficiency

Air Traffic Procedures document air traffic services and how they are implemented. The introduction of new systems, or changes to existing systems, may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

AT Training for Reduce Horizontal Separation Standards - "3 Miles Everywhere" - to Increase Capacity and Efficiency

Air Traffic (AT) training is provided to the AT workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AT Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

Non-FAA Pilot Procedure Development for Reduce Horizontal Separation Standards - "3 Miles Everywhere" - to Increase Capacity and Efficiency

A number of NAS users document the way their activities are to be carried out. The introduction of new systems, or changes to existing systems may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development will generally begin once ATC procedures have been established and be complete by 90 days prior to Initial Operating Capability, in order to facilitate training.

Non-FAA Pilot Training for Reduce Horizontal Separation Standards - "3 Miles Everywhere" - to Increase Capacity and Efficiency

Non-FAA Pilot Training is provided to educate pilots as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional pilot training. Training will generally begin 60 days prior to IOC and be complete within one year following Full Operating Capability.

People

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Radar Associate Controller

A Radar Associate Controller performs the following activities: Ensure separation, initiate control instructions; operate interphones; Accept and initiate non-automated handoffs; and ensure radar controller is made aware of the actions; Assist the radar controller by accepting or initiating automated handoffs/pointouts which are necessary for the continued smooth operation of the sector, and ensure that the radar controller is made immediately aware of any action taken; Coordinate, including pointouts; Monitor radios when not performing higher priority duties; Scan flight progress strips; Correlate with radar data; Manage flight progress strips; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the radar controller when aware of those instructions.

Radar Controller

A Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate automated handoffs; Assist the radar associate controller with non-automated handoff actions when needed; Assist the radar associate controller in coordination when needed; Scan radar display; Correlate with flight progress strip information; Ensure computer entries are completed on instructions or clearances you issue or receive; Ensure strip marking is completed on instructions or clearances you issue or receive.

Radar Coordinator

A Radar Coordinator performs the following activities: Perform interfacility/ intrafacility/sector/controller coordination of traffic actions; Advise the radar controller and the radar associate controller of sector actions required to accomplish overall objectives; Perform any of the functions of the sector team which will assist in meeting situation objectives.

Supervisory Air Traffic Control Specialist

The supervisor is responsible for overall facility operations during an assigned shift. Duties include ensuring adequate staffing for the operational situation, monitoring operational positions, and ensuring functions are performed in accordance with directives.

Tactical Controller

A Tactical Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios and data link; Oversee data link communications by the associate tactical controller; Accept and initiate automated handoffs; Assist the planning controller with non-automated handoff actions when needed; Assist the planning controller in coordination when needed; Scan the situation display; Correlate with flight data; Ensure computer entries are completed on instructions or clearances you issue or receive.

Interfaces

Automatic Dependent Surveillance - Broadcast Avionics ← (Target Data) → Automatic Dependent Surveillance - Broadcast Avionics

Air-to-air ADS-B target data is exchanged between aircraft for use initially as a situation awareness enhancement. This capability will be expanded to other future applications, such as precision approach and landing and self separation.

Automatic Dependent Surveillance - Broadcast Avionics ← (Target Data) → BSGS Broadcast Services Ground Station

The GBT intercepts ADS-B transmissions from aircraft in the coverage area of the GBT. The GBT transmits ADS-B reports it receives down the UAT link back up the 1090 link and vice versa.

BSGS Broadcast Services Ground Station — (Weather Data) → Automatic Dependent Surveillance - Broadcast Avionics

ADS-B Avionics (with weather application) can receive FIS weather products broadcasted by the BSGS via an ADS-B data link.

Enhanced Terminal Voice Switch ← (Voice Communication) → Enhanced Terminal Voice Switch

This interface enables ATC voice communication between controllers in same or different facilities.

Enhanced Terminal Voice Switch ← (Voice Communication) → Voice Switching and Control System Modification (Technological Refresh)

This interface enables ATC voice communication between controllers in different facilities.

Surveillance Data Processor — (Surveillance Data) → BSGS Broadcast Services Ground Station

The SDP provides surveillance data for aircraft that are not responding to beacon interrogations or providing ADS-B reports to the GBT for transmission up both the UAT and 1090 links.

Voice Switching and Control System Modification (Technological Refresh) ← (Voice Communication) → Voice Switching and Control System Modification (Technological Refresh)

This interface enables ATC voice communication between controllers in same or different facilities.

Issues

Need to develop and validate a concept of use for surveillance data fusion and its use in separation assurance. Need to consider HMI to support effective use of three-mile procedures including a more rapid update rate for enroute displays. Strategy to exploit the use of ADS-B provided positions with increased accuracy in a transition to or in airspace without the full three mile RSP coverage.

Service Group Air Traffic Services

Service ATC-Separation Assurance

Capability Aircraft to Aircraft Separation Capability

Operational Improvement

Reduce Vertical Separation Minima Above FL290 Domestic (102128)

Expanding the use of vertical aircraft to aircraft separation standards provide more user preferred altitudes for fuel efficient, minimal-time flight tracks. This implements the Reduced Vertical Separation Minima (RVSM) program in the En Route domain of the NAS.

30-Dec-2008 to 31-Dec-2010

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

The appropriate amount of vertical separation above Flight Level (FL) 290 has been a matter of discussion since the mid-1950s. Originally, the vertical separation standard was 1,000 feet at all altitudes when high-altitude flight was possible for only a small number of military aircraft. Advances in technology eventually gave transport and general aviation aircraft the capability to operate at higher altitudes, resulting in increased traffic along high-altitude route structures. Flight levels start at 180 and are stated in three digits that represent thousands of feet. The term flight level describes a surface of constant atmospheric pressure related to a reference datum of 29.92 inches of mercury. Thus, FL 290 represents the pressure surface equivalent to 29,000 feet based on the 29.92 standard pressure datum; FL 310 represents 31,000 feet; and so on. In the 1950s, a vertical separation minima standard of 2,000 feet was established between aircraft operating above FL 290. FLs 300, 320, 340, 360, 380, 400, etc., then became unusable altitudes for assignment by air traffic controllers.

Background

As the number of aircraft capable of operating at higher altitudes increased, competition for higher fuel-efficient altitudes also increased. This competition for the higher altitudes, together with sporadic worldwide fuel shortages of the 1970s, which resulted in higher fuel costs, sparked an interest in implementing reduced vertical separation minima above FL 290. Studies back then showed that aircraft altimeters had not improved sufficiently for a change to be implemented. Subsequent improvements in altimetry system performance provided renewed impetus for the Federal Aviation Administration (FAA) to consider reducing the vertical separation standard above FL 290. The advent of transponder Mode C altitude readouts provided air traffic control the means to monitor altitudes within secondary surveillance radar coverage. In 1982, member States of the International Civil Aviation Organization, which includes the United States, initiated programs to study the feasibility of safely reducing the vertical separation minimum above FL 290. These programs included studies of precision radar data to analyze aircraft vertical performance, development of the performance requirements, and a collision risk analysis to evaluate the safety of future operations in a reduced separation environment. Studies concluded that the global reduction of vertical separation would be safe and feasible, would not impose demanding technical requirements, and would be cost-beneficial. Studies also showed that the North Atlantic Minimum Navigation Performance Specification airspace was an ideal region for introducing Reduced Vertical Separation Minima (RVSM) due to the types of aircraft and the unidirectional flow of traffic. As an element in the suite of the NAS Operational Evolution Plan Domestic Reduced Vertical Separation Minima (DRVSM) is implemented after thorough assessments of safety implications, and safety evaluations. DRVSM Expanding use of vertical aircraft-to-aircraft separation standards provides more user-preferred altitudes for fuel-efficient, minimal-time flight tracks. This implements the RVSM program in the En Route domain of the National Airspace System.

The FAA has implemented DRVSM from FL 290 to FL 410 in the airspace of the contiguous 48 states, Alaska, and Gulf of Mexico airspace where the FAA provides air traffic services. The FAA added a new section to Part 91 and revised existing sections to permit reduction in the vertical separation minimum from 2,000 feet to 1,000 feet. The rule requires aircraft flying between FL 290 and FL 410 to meet altimetry system error requirements, automatic keeping requirements, and the altitude alert system requirements to qualify for DRVSM operations.

Enhanced automation and surveillance processed by the Software Development Plan via the System Wide Information Management system provides visual cues for controllers on the Standard Automation Platform Workstation that distinguish between RVSM-approved and non-RVSM-approved aircraft. Conflict alert automation also distinguishes between RVSM and non-RVSM aircraft and provides alerts for the 2,000-feet versus1,000-feet separation as appropriate.

Monitoring ensures that participating aircraft comply with the standards for DRVSM. A Central Monitoring Agency oversees the ground based monitoring units and Global Positioning System (GPS)- based monitoring system. The FAA deployed three ground-based height monitoring units underlying the most frequently over flown areas in the NAS. The ground-based units provide operators a cost-free method to meet their monitoring goals. An alternative monitoring choice is the FAA-developed GPS Monitoring System that has been available since 1996.

Benefits

Reduced vertical separation minima (RVSM) makes six additional flight levels (for a total of 13) available for operations between FL 290-410. (Previous FL orientation schemes applied between FL 290-410 provide seven useable FLs). RVSM allows the potential to increase sector capacity by enhancing traffic throughput and efficiency within en route airspace. It also enhances controller flexibility by providing more options for situations such as weather reroutes and crossing traffic. In addition, RVSM enhances the predictability of operations by increasing the flight levels available to move aircraft, which allows more aircraft to fly at requested flight levels.

Systems

Air Route Surveillance Radar - Model 1E

The Air Route Surveillance Radar - Model 1E (ARSR-1E) is a 1970s analog radar. It is a long-range radar system with a maximum detection range of 200 nm. The ARSR-1E is a surveillance system used to detect azimuth and slant range of en route aircraft operating between terminal areas. It also provides weather intensity data.

Air Route Surveillance Radar - Model 2

The Air Route Surveillance Radar - Model 2 (ARSR-2) is a 1970s analog radar. It is a long-range radar system with a maximum detection range of 200 nm. The ARSR-2 is a surveillance system used to detect azimuth and slant range of en route aircraft operating between terminal areas. It also provides weather intensity data.

Air Route Surveillance Radar - Model 3

The Air Route Surveillance Radar - Model 3 (ARSR-3) is a 1980s radar that provides primary long range surveillance data, including slant range and azimuth data. It processes the returns which includes demodulation, analog-to-digital conversion, moving target indicator function, sensitivity time control, range and azimuth gating, and digital target extraction - all of which are performed digitally (with the exception of the demodulation and analog-to-digital conversion). In addition, the ARSR-3 has a weather channel with associated processing to provide weather contour information in digital format.

Air Route Surveillance Radar - Model 4

The Air Route Surveillance Radar - Model 4 (ARSR-4) is a three-dimensional, long-range, rotating phased array, primary surveillance radar with integrated height finder capability. It is part of the joint surveillance system (JSS) used in conjunction with ARSR-3 coverage as part of the nationwide air defense command surveillance network. In addition to functions peculiar to the military, the ARSR-4 performs the same basic functions of the ARSR-3, by providing primary long-range surveillance data, including slant range and azimuth data.

Air Traffic Control Beacon Interrogator - Model 4

The Air Traffic Control Beacon Interrogator - Model 4 (ATCBI-4) is an air traffic control (ATC) beacon system that interrogates transponder-equipped aircraft. It is a secondary radar system that interrogates transponders, receives aircraft identification, and determines position data.

Air Traffic Control Beacon Interrogator - Model 5

The Air Traffic Control Beacon Interrogator - Model 5 (ATCBI-5) is an air traffic control (ATC) beacon system that interrogates transponder-equipped aircraft. It is a secondary radar system that interrogates transponders, receives aircraft identification, and determines position data.

Air Traffic Control Beacon Interrogator - Model 6

The Air Traffic Control Beacon Interrogator Model 6 (ATCBI-6) is a ground-based system that interrogates transponders, receives and processes replies from transponders, determines the range and azimuth to the aircraft, and forwards the information to appropriate air traffic control (ATC) automation systems. Replies provide identification and altitude data of the transponder.

Airport Surveillance Radar - Model 11

The Airport Surveillance Radar- Model 11 (ASR-11) is a digital, combined primary and secondary surveillance radar (SSR), short-range radar system with a 60 nautical mile (nmi) detection range for medium and small activity airports. The ASR-11 provides advanced digital primary radar including weather intensity surveillance with an integrated monopulse SSR system for use in the airport terminal area. The ASR-11 is used to detect and report the presence and location of an aircraft in a specific volume of airspace. The ASR-11 provides search radar surveillance coverage in controlled airspace primarily in terminal areas.

Airport Surveillance Radar - Model 7

The Airport Surveillance Radar - Model 7 (ASR-7) is a short-range (60 nm) analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the Air Traffic Control Beacon Interrogator - Model 4 or Model 5 (ATCBI-4 or ATCBI-5) or Mode S. This system will be replaced by the ASR-11.

Airport Surveillance Radar - Model 8

The Airport Surveillance Radar - Model 8 (ASR-8) is a short-range (60 nm), analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the Air Traffic Control Beacon Interrogator - Model 4 or Model 5 (ATCBI-4 or ATCBI-5) or Mode S.

Airport Surveillance Radar - Model 9

The Airport Surveillance Radar - Model 9 (ASR-9) is a short range (60 nm) radar system for the airport terminal area. The ASR-9 processes the returns from aircraft targets, which includes demodulation, analog-to-digital conversion, range and azimuth gating, sensitivity timing control, and a moving target detection function. The moving target detector includes two-level weather contour processing, digital signal processing, correlation and interpolation processing, and surveillance processing. The ASR-9 has a separate weather channel with associated processing capable of providing six-level weather contours. The two-level weather contour processing associated with the moving target detector is only be used for backup. The six-level weather channel is primarily used to supplement Next Generation Weather Radar (NEXRAD) coverage. It is normally used in conjunction with Mode Select (Mode S) but it can accommodate an Air Traffic Control Beacon Interrogator Model 4/5 (ATCBI-4/5).

The ASR-9 will be upgraded/replaced with the ASR-9/Mode S SLEP (see separate mechanism) in the 2007-12 time frame.

Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program)

The Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) (ASR-9/Mode S (SLEP)) mechanism provide the necessary technical refresh to extend the service life of the ASR-9 and Mode S through 2030. The ASTERIX upgrade has not been implemented, but will be implemented at a later date.

Automated Radar Terminal System - Model IIE

The Automated Radar Terminal System - Model IIE (ARTS IIE) provides radar data processing (RDP) and decision support tools to the controller in the terminal environment. Utilized at low to medium-size Terminal Radar Control (TRACONs) Facilities the ARTS IIE is capable of receiving input from up to 2 sensors, can process up to 256 tracks simultaneously, and support up to 22 displays. The ARTS IIE implements the Common ARTS software for improved performance maintenance efficiency. The radar data processing (RDP) software provides automated surveillance tracking and display processing. Included in the ARTS IIE software are decision support tools such as Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Mode C intruder alert, Converging Runway Display Aid (CRDA), and Controller Automation Spacing Aid (CASA).

Automatic Dependent Surveillance (Capstone) Ground Station

The Automatic Dependent Surveillance (Capstone) Ground Station (ADS (Cap) Ground Station) is a demonstration system used by the Capstone project under Safe Flight 21. It receives Global Positioning System (GPS)-derived aircraft four (4)-dimensional position data, aircraft identification, aircraft velocity, and other selected aircraft data for processing at ATC facilities, and transmits Traffic Information System - Broadcast (TIS-B) information on aircraft in areas of radar coverage (and other airspace status information when available) to properly to equipped aircraft, to support operational trials. These ground stations are located in remote locations in Alaska, and feed the Anchorage Air Route Traffic Control Center (ARTCC) automation system.

Automatic Dependent Surveillance (Safe Flight 21) Ground Station

The Automatic Dependent Surveillance (Safe Flight 21) Ground Station (ADS (SF-21) Ground Station) is a demonstration system used by the Ohio Valley project under the Safe Flight 21 program. It receives Global Positioning System (GPS)-derived aircraft four (4)-dimensional position data, aircraft identification, aircraft velocity, and other selected aircraft data for processing at selected ATC facilities, and transmits Traffic Information System - Broadcast (TIS-B) information on aircraft in areas of radar coverage (and other airspace status information when available) to properly to equipped aircraft, to support SF-21 operational trials. These ground stations will be located in the regions surrounding Memphis, TN and Louisville, KY, and interface with developmental surveillance processing systems.

Automatic Dependent Surveillance - Broadcast (Capstone) Avionics

Automatic Dependent Surveillance - Broadcast (Capstone) Avionics (ADS-B (Cap) Avionics) are the surveillance avionics used by the Capstone project under Safe Flight 21. These are demonstration avionics that are used to support ADS-B-related operational trials in Alaska.

Digital Airport Surveillance Radar

The Digital Airport Surveillance Radar (DASR) provides advanced digital primary radar including weather intensity surveillance with an integrated mono-pulse Secondary Surveillance Radar (SSR) system for use in the airport terminal area. (Military version of ASR-11)

Digital Voice Recorder System

Provides modern digital voice recording devices used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

In Feburary 2004, the DVRS was upgraded with a 24-channel card, which replaced the 16-channel card. This minor upgrade, called DVR II, was not extended to the systems installed prior to February 2004.

Digital Voice Recorder System Replacement

The Digital Voice Recorder System Replacement (DVRS Replacement) is a modern digital system used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

Direct Access Radar Channel

The Direct Access Radar Channel (DARC) provides a back-up processing path to provide surveillance data to the displays in the event of a primary channel (Host Computer System (HCS) failure. The DARC path is a physically, logically and electrically separate processing path (with diverse hardware and software) from the primary Host Computer System (HCS) Radar Data Processing (RDP) paths. Thus DARC provides a tertiary path, to keep radar data on the controller"s displays, should both HCS RDP paths be disabled for any reason. The DARC provides radar data processing, very limited flight data processing, but with significantly less functionality than the HCS. Basically, DARC serves as a lifeboat should both HCS processing paths become disabled.

Display System Replacement (key system)

The Display System Replacement (DSR) provides continuous real-time, automated support to air traffic controllers for the display of surveillance, flight data and other critical control information. This information is processed by the Host and Oceanic Computer System Replacement (HOCSR) and the Enhanced Direct Access Radar Channel (EDARC) subsystems. The DSR provides controller workstations, displays, and input/output devices and a communications infrastructure to connect the DSR with external processing elements of the en route ATC automation system.

Emergency Voice Communications System

The Emergency Voice Communications System (EVCS) is located at Headquarters (HQ), Regional Offices, several Air Route Traffic Control Centers (ARTCCs), Terminal Radar Approach Control (TRACON) facilities, and other selected sites. EVCS uses two (2) dedicated Federal Telecommunications Service 2001 (FTS2001) dial access channels at most FAA locations. Dedicated dial lines using the Public Switched Telephone Network (PSTN) are used at locations not having direct access to FTS2001. Supports HQ and Regional Communications Command Centers'' functions for accident and incident reports, hijacks, aircraft crashes, aviation security matters, military activities, natural disasters, etc.

En Route Automation Modernization (key system)

The En Route Automation Modernization System (ERAM System) will replace the existing diverse but functionally unequal primary and backup channels (Host and DARC) with redundant, functionally equivalent primary and backup channels. The new primary and backup channels achieve identical full functionality by using highly reliable fault tolerant processing elements running identical software. A tertiary system with diverse software, and physical and electronic isolation from the ERAM primary and back-up systems, will be maintained as fall back until the functionality, reliability, and availability of ERAM is demonstrated in the field. A training subsystem with functionality identical to the operational system will permit training to be conducted in parallel with operations.

In the past decade, several functions (URET, CTAS, etc.) were implemented as outboard processors/processes to the Host. As ERAM evolves in successive builds, this functionality will be integrated into ERAM as described below.

ERAM''s enhanced FDP will accommodate flexible routing around congestion, weather, and restrictions and improve efficiency by providing improved traffic flows. The enhanced ERAM surveillance processing will accomodate a larger geographic coverage, increased quantity of radar inputs and, when available, integration of Automatic Dependent Surveillance Broadcast data. In addition ERAM will use the improved accuracy and information disseminated by the sensors using the All-purpose Structured EUROCONTROL Radar Information Exchange (ASTERIX) format.

ERAM will allow for improved performance of decision support tools such as the Enhanced Traffic Management System (ETMS). ERAM will also incorporate Center-terminal radar approach control automation system (CTAS) functions (descent advisor, timelines, load graphs, automated miles-in-trail, and the situation display) and multi-center metering using miles-in-trail or time-based scheduling and meter lists.

ERAM will employ an industry standard LAN-based system to improve the efficiency of integrating commercial-off-the-shelf solutions in the future. ERAM software will be developed using a common high-level language to increase the FAA''s access to market-based skills and lower the cost of development and lifecycle maintenance. ERAM''s design will enable future enhancements and maintenance of components without affecting operational availability and increased productivity from an integrated monitor and control capability.

Enhanced Back-up Surveillance

The Enhanced Back-Up Surveillance (EBUS) system replaces the DARC system in use at the 20 Air Route Traffic Control Centers (ARTCC) in the contiguous United States (CONUS), the William J. Hughes Technical Center (WJHTC), and the FAA Academy (FAAAC). The EBUS design employs the existing FAA-certified software of the Microprocessor En Route Automated Radar Tracking System (Micro-EARTS) application to provide radar data processing (RDP) services for the replacement legacy backup system. Micro-EARTS provides key capabilities not supported by the DARC legacy system it replaces, among which are the safety functions of Conflict Alert (CA), Mode-C Intruder (MCI), and Minimum Safe Altitude Warning (MSAW). EBUS also provides Next Generation Radar (NEXRAD) weather data to R-position users via the DSR Backup Communications Network (BCN). EBUS makes the R-position functionality on the backup channel more comparable to that of the primary channel.

The EBUS software (Micro EARTS) and the ECG backup gateway software will share the same hardware platform such that both software functions will reside in the same ECG backup gateway hardware platform.

Fixed Position Surveillance - Model 117

The Fixed Position Surveillance - Model 117 (FPS-117) radar is a joint-use military surveillance system used by the FAA to detect slant range and azimuth of en route aircraft. These radars are located in Alaska (12) and Hawaii (1), and are expected to be sustained until at least 2020.

Fixed Position Surveillance Model 20 Series

The Fixed Position Surveillance Model 20 Series (FPS-20 Series) is a military primary radar of various models (FPS-20A, FPS-64, FPS-66A, FPS-67/A/B, and ARSR-60M) used by the FAA to detect slant range and azimuth of en route aircraft operating between terminals in the continental United States. Each of the different radar models is a similar variation of the original FPS-20 military radar.

Heating, Ventilation and Air Conditioning - Long-Range Radar

The Heating, Ventilation and Air Conditioning - Long-Range Radar (HVAC - LRR) mechanism provides the systems to maintain the temperature and relative humidity within the facility at acceptable levels for LRR system operation or personnel comfort as required. This includes filtering of air to Occupational Safety and Health Administration (OSHA) requirements.

Height Monitor Unit

Continue developing 3rd and final set of simulations including interface with Mexico and Canada. Develop required modifications to NAS enroute systems. Finalize Procedures, complete simulations, and begin implementation. Refine program, and complete implemention nationwide. Continue program maintenance and modeling of enhancements.

High Frequency Airborne Radios

High Frequency (HF) Airborne Radios are analog (HF multi-channel radio transceivers operating in the 2 - 30 Mhz frequency band installed in airborne commercial, cargo, and military aircraft transiting the oceanic, en route, terminal, or flight service station airspace domains. These transceivers are typically used in transoceanic applications.

Host Computer System (key system)

The Host Computer System (HCS) receives and processes surveillance reports, and flight plan information. The HCS sends search/beacon target, track and flight data, surveillance and alphanumeric weather information, time data, traffic management advisories and lists to the (Display System Replacement) DSR. The HCS associates surveillance-derived tracking information with flight-planning information. The DSR sends requests for flight data, flight data updates, and track control messages to the HCS. HCS-generated display orders are translated for use within the DSR workstation. While radar data processing is distributed among the terminal and En Route computer resources, the HCS performs virtually all of the flight data processing for its entire geographical area of responsibility. Every tower (ATCT) and terminal radar approach control (TRACON) relies exclusively on its parent HCS for flight data.

The HCS also runs algorithms that perform aircraft to aircraft (conflict alert) and aircraft to terrain (Minimum Safe Altitude Warning) separation assurance. The HCS algorithms provide visual and audible alerting to the controller when conflicts are identified.

The HCS presently supplies real time surveillance, flight data and other information to several decision support tools housed in collocated outboard processors connected via two-way high bandwidth links to the HCS and DSR. These are the (User Request Evaluation Tool, (URET), and the Traffic Management Advisory (TMA. URET performs probing of tentative flight plan changes to determine their viability. TMA provides sequencing and spacing information to align the aircraft in En Route airspace for approach.

Host Computer System / Oceanic Computer System Replacement (key system)

The Host Computer System & Oceanic Computer System Replacement (HCS/OCSR--HOCSR) was implemented because of potential Y2K hardware issues with previous hardware. Accordingly, HCS/OCSR provided a new hardware platform, new peripherals (printers and Keyboard Display Video Terminals--KVDT), a new Direct Access Storage Device (DASD), and new OS-370 software extensions to control the new hardware using legacy NAS software applications. Hardware was replaced in both the En Route and Anchorage Oceanic automation environments. HCS/OCSR did not modify the legacy software functions of either the HCS system (e.g., flight data processing, radar data processing) or the Ocean Display and Planning System (ODAPS) automation systems (e.g., filght data processing). Likewise, HCS/OCSR did not impact HID NAS LAN, URET, DSR or PAMRI.

Phase 1 and 2 (mainframe and software extension replacements) were completed prior to 2000. Phase 3 (DASD replacement) was completed in 2003. Phase 4 (peripheral replacement) will be completed in 2004. Enhancement planned for 2005 and beyond were cancelled as they are overtaken by ERAM. Each phase has its own waterfall, and consequently no waterfall can be provided in the Location section below.

Low-Density Radio Communications Link

The Low-Density Radio Communications Link (LDRCL) is an FAA owned Low-Density Radio Communications Link (LDRCL) satisfies short-haul, low-density communication requirements. It provides user access (via tail circuits) to a Radio Communications Link (RCL) site or connectivity between two operational facilities

Microprocessor-En Route Automated Radar Tracking System

The Microprocessor-En Route Automated Radar Tracking System (Micro-EARTS) is a radar processing system implemented with Commercial Off-the-Shelf (COTS) equipment, for use in both En Route and Terminal environments. It provides single sensor and a mosaic display of traffic and weather using long- and short-range radars. At Anchorage, Alaska, Micro-EARTS also provides Automatic Dependent Surveillance-Broadcast (ADS-B) surveillance and display. Micro-EARTS interfaces with multiple types of displays, including Display System Replacement (DSR), Digital Bright Radar Indicator Tower Equipment (DBRITE), and the flat panel tower controller displays.

Mode 3/AC Transponder

A Mode 3/AC Transponder (Mode 3/AC XPNDR) is a device that responds to an Air Traffic Control Radar Beacon System (ATCRBS) or Mode S interrogation by transmitting a 12-bit code that identifies an aircraft. Mode 3 is the military identity mode. Mode A is the civil identity mode. Mode 3 and Mode A are reported in identical formats and are called Mode 3/A. The Mode 3/A code in the field consists of 12-bits divided into four groups (A, B, C, and D) of three bits each. The Mode 3/A identity code consists of only four digits, each digit being the octal representation of one of the four groups in the field and listed in the order ABCD. A Mode C transponder is a device that responds to a Air Traffic Control Radar Beacon System (ATCRBS) or a Mode Select (Mode S) interrogation by transmitting an altitude gray code from the aircraft blind altitude encoder.

Mode Select Transponder

The Mode Select Transponder (Mode S Transponder) is an avionics system that responds to 1,030 MHz interrogations from ground-based sensors or Traffic Alert and Collision Avoidance System (TCAS) airborne avionics with 1,090 MHz replies containing aircraft identification, altitude, and other selected data. Mode S transponders offer improvements over conventional Air Traffic Control Radar Beacon System (ATCRBS) transponders in that they provide over 16 million unique beacon codes, can be selectively interrogated to prevent overlapping or garbling of replies from proximate aircraft, and can provide a high-capacity air-ground data link. In addition to responding to "all call" or "roll call" interrogations from ground-based sensors or TCAS avionics, the Mode S transponders are required to transmit or squitter their 24-bit unique identity and altitude once per second. These squitters are "voluntary" or automatic and not in response to any interrogation. The squitters allow TCAS avionics in proximate aircraft or other systems to acquire Mode S equipped aircraft by only listening on 1,090 MHz.

Multi-Mode Digital Radios

Multi-Mode Digital Radios (MDRs) are ground-based Very High Frequency (VHF) air-traffic-control radios that can operate in several configurations: 1) analog voice with 25kHz channel spacing; 2) analog voice with 8.33 kHz channel spacing; and 3) VHF Data Link (VDL) Mode-3 which consists of two-way digital voice and data communication.

Peripheral Adapter Module Replacement Item

The Peripheral Adapter Module Replacement Item (PAMRI) is an interface peripheral to the HOCSR. It provides a conduit through which the HOCSR receives and exchanges data, primarily radar data, flight data and interfacility data. The PAMRI converts communication protocols and translates data formats so the Host and EDARC can communicate with external devices.

Power System - Long-Range Radar

The Power System - Long-Range Radar (Pwr Sys - LRR) mechanism provides conditioning of commercial power, including uninterruptible power systems (UPS), to eliminate voltage dropouts, surges, and voltage sags caused by sources outside the facility. Power distribution, grounding, bonding and shielding of electrical system within the facility is also part of the Pwr Sys - LRR.

Radio Communication Link

Radio Communication Link (RCL) is an integrated voice and data microwave transmission system designed to provide the FAA with cost effective and reliable service for its high capacity NAS communications routes. RCL interconnects air route traffic control center (ARTCC) facilities with long range radar installations and other air traffic control (ATC) facilities.

Radio Control Equipment

Radio Control Equipment (RCE), located at both ATC facilities and remote communication sites, control the operation of remotely located ground to air Very High Frequency/Ultra High Frequency (VHF/UHF) radios used by air traffic controllers to communicate with pilots. RCE interfaces with the voice switch at the ATC facility, telephone landlines, and ground to air radios at the En Route Remote Communications Air/Ground (RCAG) sites, Terminal Remote Transmitter/Receiver (RTR) sites, and Flight Service Station Remote Communications Outlet (RCO) sites.

Satellite Communication Airborne Radios

The Satellite Communication (SATCOM) airborne radios are transceivers installed in commercial, cargo, and military aircraft transiting in the National Airspace System (NAS) and are used as an alternate means of voice communications between pilots in aircraft and ground controllers. These transceivers are typically used in transoceanic applications.

Satellite Communication Ground Radios

Satellite Communications (SATCOM) Ground Radios are transceivers installed at oceanic and en route facilities to support an alternative means of tactical air traffic control (ATC) voice communications between ground controllers and pilots in aircraft. These transceivers are typically used in transoceanic applications. These transceivers are also installed at regional facilities and used as an alternate means of communications in case of total ground communications failure or between locations in mountainous terrain or where other means of communications are not possible (e.g., Alaska).

Oceanic air to ground satellite communications are provided via a communications service provider. The FAA currently has no plans to develop or implement its own air to ground SATCOM ground radios.

Surveillance Data Network

National Airspace System (NAS) surveillance systems, including radar and automatic dependent surveillance systems will provide surveillance data objects via the Surveillance Data Network (SDN), which is a sub-network of the System Wide Information Management (SWIM) and the FAA Telecommunication Infrastructure (FTI). The published Surveillance Data Objects (SDO) will be made available to NAS and other users, including the Transportation Security Administration, Department of Defense, and others. Surveillance data availability supports 3-mile separation standards, gate-to-gate traffic management, seamless airspace, and dynamic resectorization. Improved surveillance information is provided in a timely and consistent manner seamlessly across the NAS for operations, planning, and decision making. The information will be available to all users and service providers via SDO in near real time. This information enables decisions to be based on a shared common view of situations, even as conditions are changing. Improved surveillance with SDOs will provide the automation higher quality of data for seamless surveillance and, in combination with other capabilities and new procedures, enable capacity and safety improvements. These benefits accrue from increased situation awareness by decision makers and improved operation of decision support and analysis tools that use surveillance information.

Surveillance Data Processor

SDP is a component of SAP and operates in En Route and Terminal. The SDP will make improvements to sensors and automation systems that will allow for expanded use of 3-mile separation and terminal procedures. The operational improvements enable more efficient control of aircraft and use of airspace. To accomplish this, all 1030/1090 Beacon interrogators will be upgraded to disseminate their existing 1.2 milli-radian azimuth accuracy and other information, such as time of measurement, confidence, quality, and so on. The automation system algorithms will be improved or new algorithms will be developed to exploit the additional information content of the improved surveillance reports. The method of presentation (display) to support 3-mile separation will be developed and tested to ensure safety. The existing long-range sensor surveillance update period is (12 seconds) and is insufficient to support 3-mile separation. In areas where only long-range sensors exist and where the Air Traffic Service requires 3-mile separation, these sensors may be modified to double the update rate to achieve 3-mile separation.

Surveillance Processor (Safe Flight 21)

The Surveillance Processor (Safe Flight 21) is a demonstration system that receives, processes, and distributes surveillance data between Safe Flight 21 (SF-21) architectural elements to support operational trials. The processor receives surveillance data from various sources, including surveillance sensors, Automatic Dependent Surveillance-Broadcast (ADS-B) systems, multilateration systems, Air Traffic Control (ATC) automation systems, and flight plan processing systems. The processor fuses the various surveillance data to create aircraft track data, which is distributed to various SF-21 architectural elements. One of the capabilities supported by the processor is the processing and distribution of Traffic Information Services - Broadcast (TIS-B) information to ADS (SF-21) Ground Stations, for subsequent transmission to aircraft.

Ultra High Frequency Airborne Radios

The Ultra High Frequency Avionics (UHF Avionics) are analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225-400 MHz frequency band, which are multi-channel transceivers, installed in an airborne military platform. These airborne devices support the tactical two-way voice communications/ coordination between the military pilot in the military aircraft and the controller on the ground.

Ultra High Frequency Ground Radios

Ultra High Frequency (UHF) Ground Radios are analog UHF amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 Mhz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and flight service station domains.

Ultra High Frequency Ground Radios - Replacement

The Ultra High Frequency Ground Radios - Replacement (UHF Ground Radios - Repl) mechanism represents analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 MHz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and Flight Service Station domains.

Very High Frequency Airborne Radios

Very High Frequency (VHF) Airborne Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 Mhz frequency band which are multi-channel transceivers installed in an airborne platform (e.g., commercial, cargo, and general aviation aircraft). These airborne devices support the tactical two-way voice communications/coordination between the pilot in the aircraft and the controller on the ground.

Very High Frequency Ground Radios

Very High Frequency (VHF) Ground Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 MHz frequency band which are single-channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the pilot in commercial, cargo, or general aviation aircraft in the oceanic, en route (i.e., ARTCC), terminal (i.e., TRACON/tower), and flight service station domains. Additionally, there are analog VHF frequency modulation (VHF - FM) radio devices operating in the 161 - 174 MHz frequency band that are multi-channel transceivers. These transceivers are used by flight inspection, aviation security, and airway facility specialists supporting local airport operations and maintenance or to perform their operational maintenance mission in support of the NAS. However, these same VHF-FM transceivers are also used to support the resolution of emergency situations or establish a level of voice command and control communications/coordination during disaster recovery.

Very High Frequency Multi-Mode Airborne Radios

Very High Frequency Multi-Mode Airborne Radios (VHF MM Airborne Radios) refers to an airborne radio operating in the very high frequency (VHF) range capable of operating in the following modes: (1)) analog voice (i.e., 25 kHz spacing for use in the United States and other similarly equipped countries); (2) VHF Digital Link Mode 2 (VDL Mode-2) (two-way digital data transmission); (3) VHF Digital Link Mode 3 (VDL Mode-3), (integrated two-way digital voice/data transmission); and (4) analog voice (i.e., 8.33 kHz spacing for use in Europe and other similarly equipped countries).

Voice Switching and Control System

The Voice Switching and Control System (VSCS) is installed in the Air Route Traffic Control Center (ARTCC). The VSCS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The VSCS provides the Air Traffic Control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ARTCC (intercom), interconnectivity between controllers in separate ARTCCs (interphone), and interconnectivity between ARTCC controllers and Terminal Radar Approach Control (TRACON) controllers/Airport Traffic Control Tower (ATCT) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ARTCC controllers and pilots is also supported by the VSCS.

Voice Switching and Control System Modification (Control System Upgrade)

The VSCS control system upgrade (VCSU) is a replacement of the Tandem computers that perform the logical switching and control for the VSCS system. The replacement of Tandem computers is for all ARTCCs including three spares.

Voice Switching and Control System Modification (Technological Refresh) (key system)

The Tech Refresh for VSCS is a service life extension. The Tech Refresh encompasses workstation upgrade, video display monitor, control equipment power, VSCU supportability, control shelf power supply, and software development demonstration system expansion.

Voice Switching and Control System Training and Backup Switches

Voice Switching and Control System Training and Backup Switch (VTABS) was developed to meet AT requirements for a separate standalone VSCS Backup and Training System. VTABS can be configured as a 50-position switch with the capability to support air traffic operations in the event of VSCS failure, hardware and software maintenance or power loss.

Support Activities

AT Procedure Development for Reduce Vertical Separation Minima Above FL290 Domestic

Air Traffic Procedures document air traffic services and how they are implemented. The introduction of new systems, or changes to existing systems, may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

AT Training for Reduce Vertical Separation Minima Above FL290 Domestic

Air Traffic (AT) training is provided to the AT workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AT Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

FAA Certification for Reduce Vertical Separation Minima Above FL290 Domestic

FAA certification is an activity necessary to support people and systems in the delivery of NAS services. Avionics and associated systems are deemed to be critical to the safety of flight and must be certificated. In addition certain operators and service providers require to be certified such as pilots, dispatchers and others. Certification will generally begin 24 months prior to Initial Operating Capability, and be complete prior to receiving or giving service.

FAA Rulemaking for Reduce Vertical Separation Minima Above FL290 Domestic

FAA Rulemaking is necessary when Federal Air Regulations require or change the delivery of NAS services. The regulatory process must be complete prior to implement or service provision. The lead time for change vary greatly due to the varieties of scope but will take a minimum of 180 days before implemented.

Non-FAA Pilot Procedure Development for Reduce Vertical Separation Minima Above FL290 Domestic

A number of NAS users document the way their activities are to be carried out. The introduction of new systems, or changes to existing systems may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development will generally begin once ATC procedures have been established and be complete by 90 days prior to Initial Operating Capability, in order to facilitate training.

Non-FAA Pilot Training for Reduce Vertical Separation Minima Above FL290 Domestic

Non-FAA Pilot Training is provided to educate pilots as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional pilot training. Training will generally begin 60 days prior to IOC and be complete within one year following Full Operating Capability.

People

Air Traffic Control Specialist

A person authorized to provide air traffic control services.

Federal Aviation Administration Headquarters Personnel

Captures personnel costs for non air traffic personnel and airway facilities (AAF) installations staff. Contains operations and maintenance (O&M) costs for personnel in the following areas: regulation and certification; security; safety; acquisition; commercial space; airports; administration; and administration staff.

Flight Certification Specialist

Flight Certification Specialists support aircraft and aircraft component certification, continued airworthiness monitoring and inspection, and new or revised flight regulations that change operating procedures.

Non-Radar Controller

A Non-Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate transfer of control, communications, and flight data; Ensure computer entries are completed on instructions or clearances issued or received; Ensure strip marking is completed on instructions or clearances issued or received.

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Planning Controller

A Planning Controller performs the following activities: Ensure separation; Initiate control instructions; Operate interphones; Conduct air/ground communications via data link; Coordinate tactical traffic flows; Scan flight data; Correlate with situation data; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the tactical controller when aware of those instructions.

Radar Associate Controller

A Radar Associate Controller performs the following activities: Ensure separation, initiate control instructions; operate interphones; Accept and initiate non-automated handoffs; and ensure radar controller is made aware of the actions; Assist the radar controller by accepting or initiating automated handoffs/pointouts which are necessary for the continued smooth operation of the sector, and ensure that the radar controller is made immediately aware of any action taken; Coordinate, including pointouts; Monitor radios when not performing higher priority duties; Scan flight progress strips; Correlate with radar data; Manage flight progress strips; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the radar controller when aware of those instructions.

Radar Controller

A Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate automated handoffs; Assist the radar associate controller with non-automated handoff actions when needed; Assist the radar associate controller in coordination when needed; Scan radar display; Correlate with flight progress strip information; Ensure computer entries are completed on instructions or clearances you issue or receive; Ensure strip marking is completed on instructions or clearances you issue or receive.

Radar Coordinator

A Radar Coordinator performs the following activities: Perform interfacility/ intrafacility/sector/controller coordination of traffic actions; Advise the radar controller and the radar associate controller of sector actions required to accomplish overall objectives; Perform any of the functions of the sector team which will assist in meeting situation objectives.

Tactical Controller

A Tactical Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios and data link; Oversee data link communications by the associate tactical controller; Accept and initiate automated handoffs; Assist the planning controller with non-automated handoff actions when needed; Assist the planning controller in coordination when needed; Scan the situation display; Correlate with flight data; Ensure computer entries are completed on instructions or clearances you issue or receive.

Interfaces

Host Computer System ⇐ (Flight Data) ⇒ Display System Replacement

The HCS sends flight data, time data, traffic management advisories to the DSR display and sends flight plans to the Flight Strip Printer. HCS receives flight plan amendments from ATC via entries on the R-position DSR.

Host Computer System ⇐ (Track Data) ⇒ Display System Replacement

The HCS sends target fixes and track data to DSR and receives re-assignment of surveillance to sectors from ATCs as needed. (Note: the type of data passed to DSR is not raw surveillance data but rather is Target (fixes) and track (series of fixes) data produced by the HCS RDP.

Host Computer System — (Weather Data) ⇒ Display System Replacement

The HCS sends alphanumeric weather data to the DSR. Note: This is different from weather graphics, which is displayed on the DSR D-position from WARP.

Voice Switching and Control System Modification (Technological Refresh) ⇐ (Voice Communication) ⇒ Voice Switching and Control System Modification (Technological Refresh)

This interface enables ATC voice communication between controllers in same or different facilities.

Issues

none identified

Shared Responsibility For Horizontal Separation (102118)

Improved avionics and new procedures allow air traffic controllers to delegate resolution responsibility to pilots when it is operationally beneficial to do so. Enhancements to automatic dependent surveillance and the traffic information system provide common situational awareness to the flight deck display. Pilots implement the airborne separation assurance service by using visual flight rule-like procedures between like-equipped aircraft to realize an operational advantage.

30-Jun-2015 to 31-Jul-2017

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Improved avionics (cockpit display of traffic information (CDTI)) and new procedures permit air traffic controllers to delegate resolution responsibility to pilots when it is operationally beneficial. Improved avionics capabilities and additional surveillance sources (i.e., automatic dependent surveillance broadcast (ADS-B)) provide air traffic controllers and the flight deck accurate position, trajectory, and intent data for an expanded area.

Traffic Information Services - Broadcast (TIS-B) is a surveillance service that provides broadcast traffic information to properly equipped aircraft and surface vehicles. The principal sources of data for TIS-B are surveillance radars, including airport surveillance radar, air route surveillance radar, air traffic control beacon interrogators, and airport surface detection equipment. Other sources of TIS-B data include multilateration systems, ADS-B, and other surveillance systems. The Surveillance Data Network (SDN) maintains and distributes surveillance data from these sources. Ground based transceivers (GBT) provide ADS-B data to the SDN for distribution. System Wide Information Management (SWIM) provides flight objects, including the surveillance data, associated with flight data. TIS-B reports are intended for properly equipped aircraft and surface vehicles in the GBT coverage area. The GBT broadcast traffic data is received by the ADS-B/TIS-B avionics and displayed to the pilot or surface vehicle operator on CDTI Avionics. Where there is continuous surveillance and broadcast coverage, seamless TIS-B services are provided. The quality level of traffic information provided by TIS-B is depends on the number and type of surveillance data sources available and the timeliness of the reported data.

ADS-B is a function on an aircraft or a surface vehicle that periodically broadcasts its state vector (horizontal and vertical position, horizontal and vertical velocity) and other information. An aircraft may receive ADS-B reports from other aircraft and provide received data for surveillance applications, such as cockpit traffic display or a conflict detection management system. Information available to the flight crew on a CDTI conveys position, identity, and intent of other aircraft regarding the crew's own trajectory and provides a more strategic view of air traffic. The standard automation platform workstation displays the same trajectory information to the controller. The SDN provides surveillance data via SWIM.

With agreement of both pilot and controller, a properly equipped aircraft delegates responsibility for conflict resolution to another properly equipped aircraft. For example, (1) A faster aircraft in the flight levels will be instructed to remain at least 5 miles horizontal from a slower aircraft while passing that aircraft. (2) A climbing aircraft will be instructed to remain at least 5 miles horizontal from crossing traffic until vertical separation is achieved. Rules, procedures, and training programs will need to be reviewed and modified when necessary as the roles and responsibilities of users and service provider's change.

Benefits

Delegating resolution authority for horizontal separation to pilots allows controllers to provide services to additional aircraft and increases the throughput for their sector. There is reduced controller workload through one-step clearances for conflict resolution or merging into flows. There is increased flight efficiency by ensuring minimal deviations to achieve/maintain separation.

Systems

Air Route Surveillance Radar - Model 1E

The Air Route Surveillance Radar - Model 1E (ARSR-1E) is a 1970s analog radar. It is a long-range radar system with a maximum detection range of 200 nm. The ARSR-1E is a surveillance system used to detect azimuth and slant range of en route aircraft operating between terminal areas. It also provides weather intensity data.

Air Route Surveillance Radar - Model 2

The Air Route Surveillance Radar - Model 2 (ARSR-2) is a 1970s analog radar. It is a long-range radar system with a maximum detection range of 200 nm. The ARSR-2 is a surveillance system used to detect azimuth and slant range of en route aircraft operating between terminal areas. It also provides weather intensity data.

Air Route Surveillance Radar - Model 3

The Air Route Surveillance Radar - Model 3 (ARSR-3) is a 1980s radar that provides primary long range surveillance data, including slant range and azimuth data. It processes the returns which includes demodulation, analog-to-digital conversion, moving target indicator function, sensitivity time control, range and azimuth gating, and digital target extraction - all of which are performed digitally (with the exception of the demodulation and analog-to-digital conversion). In addition, the ARSR-3 has a weather channel with associated processing to provide weather contour information in digital format.

Air Route Surveillance Radar - Model 4

The Air Route Surveillance Radar - Model 4 (ARSR-4) is a three-dimensional, long-range, rotating phased array, primary surveillance radar with integrated height finder capability. It is part of the joint surveillance system (JSS) used in conjunction with ARSR-3 coverage as part of the nationwide air defense command surveillance network. In addition to functions peculiar to the military, the ARSR-4 performs the same basic functions of the ARSR-3, by providing primary long-range surveillance data, including slant range and azimuth data.

Air Traffic Control Beacon Interrogator - Model 6

The Air Traffic Control Beacon Interrogator Model 6 (ATCBI-6) is a ground-based system that interrogates transponders, receives and processes replies from transponders, determines the range and azimuth to the aircraft, and forwards the information to appropriate air traffic control (ATC) automation systems. Replies provide identification and altitude data of the transponder.

Airport Surveillance Radar - Model 11

The Airport Surveillance Radar- Model 11 (ASR-11) is a digital, combined primary and secondary surveillance radar (SSR), short-range radar system with a 60 nautical mile (nmi) detection range for medium and small activity airports. The ASR-11 provides advanced digital primary radar including weather intensity surveillance with an integrated monopulse SSR system for use in the airport terminal area. The ASR-11 is used to detect and report the presence and location of an aircraft in a specific volume of airspace. The ASR-11 provides search radar surveillance coverage in controlled airspace primarily in terminal areas.

Airport Surveillance Radar - Model 7

The Airport Surveillance Radar - Model 7 (ASR-7) is a short-range (60 nm) analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the Air Traffic Control Beacon Interrogator - Model 4 or Model 5 (ATCBI-4 or ATCBI-5) or Mode S. This system will be replaced by the ASR-11.

Airport Surveillance Radar - Model 8

The Airport Surveillance Radar - Model 8 (ASR-8) is a short-range (60 nm), analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the Air Traffic Control Beacon Interrogator - Model 4 or Model 5 (ATCBI-4 or ATCBI-5) or Mode S.

Airport Surveillance Radar - Model 9

The Airport Surveillance Radar - Model 9 (ASR-9) is a short range (60 nm) radar system for the airport terminal area. The ASR-9 processes the returns from aircraft targets, which includes demodulation, analog-to-digital conversion, range and azimuth gating, sensitivity timing control, and a moving target detection function. The moving target detector includes two-level weather contour processing, digital signal processing, correlation and interpolation processing, and surveillance processing. The ASR-9 has a separate weather channel with associated processing capable of providing six-level weather contours. The two-level weather contour processing associated with the moving target detector is only be used for backup. The six-level weather channel is primarily used to supplement Next Generation Weather Radar (NEXRAD) coverage. It is normally used in conjunction with Mode Select (Mode S) but it can accommodate an Air Traffic Control Beacon Interrogator Model 4/5 (ATCBI-4/5).

The ASR-9 will be upgraded/replaced with the ASR-9/Mode S SLEP (see separate mechanism) in the 2007-12 time frame.

Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program)

The Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) (ASR-9/Mode S (SLEP)) mechanism provide the necessary technical refresh to extend the service life of the ASR-9 and Mode S through 2030. The ASTERIX upgrade has not been implemented, but will be implemented at a later date.

Automatic Dependent Surveillance (Capstone) Ground Station

The Automatic Dependent Surveillance (Capstone) Ground Station (ADS (Cap) Ground Station) is a demonstration system used by the Capstone project under Safe Flight 21. It receives Global Positioning System (GPS)-derived aircraft four (4)-dimensional position data, aircraft identification, aircraft velocity, and other selected aircraft data for processing at ATC facilities, and transmits Traffic Information System - Broadcast (TIS-B) information on aircraft in areas of radar coverage (and other airspace status information when available) to properly to equipped aircraft, to support operational trials. These ground stations are located in remote locations in Alaska, and feed the Anchorage Air Route Traffic Control Center (ARTCC) automation system.

Automatic Dependent Surveillance - Broadcast (Capstone) Avionics

Automatic Dependent Surveillance - Broadcast (Capstone) Avionics (ADS-B (Cap) Avionics) are the surveillance avionics used by the Capstone project under Safe Flight 21. These are demonstration avionics that are used to support ADS-B-related operational trials in Alaska.

Automatic Dependent Surveillance - Broadcast Avionics (key system)

Automatic Dependent Surveillance-Broadcast Avionics (ADS-B Avionics) transmits and receives Global Positioning System (GPS)-derived aircraft 4-dimensional position data, aircraft identification, aircraft velocity, and other selected aircraft data. Augmented GPS data may be required for certain applications. This is intended to be a surveillance system and not an avoidance system. The broadcast of own position is automatic and is intended to provide surveillance information to other users. The aircraft or vehicle originating the broadcast may not have knowledge of which users are receiving its broadcast. The ADS-B avionics are designed to transmit this 4-dimensional position data of own aircraft or vehicle and to also receive same type of information from others that are similarly equipped to receive and process ADS-B surveillance information.

BSGS Broadcast Services Ground Station (key system)

The BSGS (Broadcast Services Ground Station) supports Air-Ground broadcast services. This includes the reception of ADS-B from equipped aircraft/vehicles and the transmission of Traffic Information Service-Broadcast (TIS-B) and Flight Information Service-Broadcast (FIS-B) for use by equipped aircraft. Generally, the BSGS will interface via the SDN to provide ADS-B information to ATC automation and receive TIS-B and FIS-B information from TIS-B and FIS-B servers. The BSGS includes antenna(s), one or more dual link (i.e., 1090 MHz Extended Squitter-1090ES and Universal Access Transceiver-UAT) Ground Based Transceiver(s)(GBT), processing functions and communications functions. Several configurations of the BSGS are required to support variations in the geographic service volume and functions to be supported at specific categories of operational sites. BSGSs will be installed at 448 airports and 100 en route locations. Included are those airports equipped with Secondary Surveillance Radar (SSR) and about 140 additional towered airports (currently without SSR). The BSGS will support ADS-B and TIS-B services via both the 1090ES link and by the UAT link. The BSGS will also support FIS-B via the UAT link. BSGSs incorporate a multilink gateway function that provides ADS-B rebroadcasts via the ADS-B alternate link. A BSGS incorporating 2 GBTs are required for airport surface and terminal surveillance coverage at each of 268 smaller airports, a BSGS incorporating 3 GBTs (on average) are required at 120 of the mid-sized airports, and a BSGS incorporating 6 GBTs (on average) are required at the 60 largest airport (those equipped with ASDE-X or ASDE-3 surface surveillance systems).

The following BSGS functions are required to support the various categories of NAS BSGS sites, except as noted below: (1) 1090ES and UAT receive/transmit (i.e., the GBT funnction); (2) multi-link gateway function; (3) process received ADS-B messages and output (via the SDN) ADS-B reports for use by ATC automation; (4) accept TIS-B and FIS-B information from ground TIS-B/FIS-B servers and manage the generation and broadcast of link specific TIS-B messages via the 1090ES and UAT links and FIS-B messages via the UAT link.

The following BSGS configurations are assumed based on the category of the operational site. Except as noted below all BSGS configuration support the above described functions.

En route (100 sites): (1) One multi-sector antenna with each sector connected to the individual 1090ES and UAT receivers. Supports up to 250 nmi. ADS-B reception. En route locations that are intended to provide only low-altitude gap filler coverage do not require the long-range capability. (2) One omni-directional transmit antenna. Transmitter power sized to support the required TIS-B and FIS-B coverage for that specific site.

Terminal/Airport without ASDE-X (415 airports incl. 27 ASDE-3 equipped airports) with each site having: (1) BSGS with at least 2 GBTs with omni-directional antennas sited for both airport surface and terminal airspace coverage; (2) additional GBTs as needed to provide coverage of the primary airport surface movement area.

Terminal/Airport with ASDE-X (26 ASDE-X plus 7 upgraded ASDE-3 airports with an average of 6 GBTs per BSGS): (1) ASDE-X ground stations upgraded to support GBT functionality; (2) At least two of the GBTs provide ADS-B coverage to the edge of the terminal airspace and the TIS-B coverage; (3) ASDE provides the surveillance data source to support TIS-B for surface traffic.

Cockpit Display of Traffic Information Avionics (key system)

The Cockpit Display of Traffic Information Avionics (CDTI Avionics) is a generic name for a display that provides the flight crew with surveillance information about other proximate aircraft, including their position. It enables pilots to electronically "see and avoid" other aircraft.

Digital Airport Surveillance Radar

The Digital Airport Surveillance Radar (DASR) provides advanced digital primary radar including weather intensity surveillance with an integrated mono-pulse Secondary Surveillance Radar (SSR) system for use in the airport terminal area. (Military version of ASR-11)

Digital Voice Recorder System Replacement

The Digital Voice Recorder System Replacement (DVRS Replacement) is a modern digital system used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

Direct Access Radar Channel

The Direct Access Radar Channel (DARC) provides a back-up processing path to provide surveillance data to the displays in the event of a primary channel (Host Computer System (HCS) failure. The DARC path is a physically, logically and electrically separate processing path (with diverse hardware and software) from the primary Host Computer System (HCS) Radar Data Processing (RDP) paths. Thus DARC provides a tertiary path, to keep radar data on the controller''s displays, should both HCS RDP paths be disabled for any reason. The DARC provides radar data processing, very limited flight data processing, but with significantly less functionality than the HCS. Basically, DARC serves as a lifeboat should both HCS processing paths become disabled.

Display System Replacement (key system)

The Display System Replacement (DSR) provides continuous real-time, automated support to air traffic controllers for the display of surveillance, flight data and other critical control information. This information is processed by the Host and Oceanic Computer System Replacement (HOCSR) and the Enhanced Direct Access Radar Channel (EDARC) subsystems. The DSR provides controller workstations, displays, and input/output devices and a communications infrastructure to connect the DSR with external processing elements of the en route ATC automation system.

En Route Next Generation Secondary Surveillance Radar

En Route Next Generation Secondary Surveillance Radar (En Route (NEXGEN SS-ER)) is a future generation surveillance system capable of providing cooperative surveillance capabilities commensurate with the technology at the time.

Enhanced Terminal Voice Switch (key system)

The Enhanced Terminal Voice Switches (ETVS) are installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) facilities with more than four air traffic controller positions. The ETVS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The ETVS (installed in the ATCT) provides the ATC operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the ETVS.

The ETVS (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within a TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the ETVS.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate ETVS systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Fixed Position Surveillance - Model 117

The Fixed Position Surveillance - Model 117 (FPS-117) radar is a joint-use military surveillance system used by the FAA to detect slant range and azimuth of en route aircraft. These radars are located in Alaska (12) and Hawaii (1), and are expected to be sustained until at least 2020.

Fixed Position Surveillance Model 20 Series

The Fixed Position Surveillance Model 20 Series (FPS-20 Series) is a military primary radar of various models (FPS-20A, FPS-64, FPS-66A, FPS-67/A/B, and ARSR-60M) used by the FAA to detect slant range and azimuth of en route aircraft operating between terminals in the continental United States. Each of the different radar models is a similar variation of the original FPS-20 military radar.

Flexible Voice Switch (key system)

Voice communications is the primary means of communications among ATC facilities and between an Air Traffic Control

Specialist (ATCS) and a pilot. Voice switching provides the ATCS both G/G Interfacility/Intrafacility and A/G voice communications connectivity. The NAS Voice Switch (NVS) program will replace aging voice switches and their analog interfaces with modern digital voice switches consisting of digital interfaces. The Flexible Voice Switch will be the common platform and baseline voice switch for all NAS domains with modularity and scalability to meet communications connectivity requirements. Additionally, this switch will be expandable to accommodate growth capacity requirements and able to support NAS Modernization needs as described in various Operational Improvements.

Heating, Ventilation and Air Conditioning - Long-Range Radar

The Heating, Ventilation and Air Conditioning - Long-Range Radar (HVAC - LRR) mechanism provides the systems to maintain the temperature and relative humidity within the facility at acceptable levels for LRR system operation or personnel comfort as required. This includes filtering of air to Occupational Safety and Health Administration (OSHA) requirements.

High Frequency Airborne Radios

High Frequency (HF) Airborne Radios are analog (HF multi-channel radio transceivers operating in the 2 - 30 Mhz frequency band installed in airborne commercial, cargo, and military aircraft transiting the oceanic, en route, terminal, or flight service station airspace domains. These transceivers are typically used in transoceanic applications.

Host Computer System

The Host Computer System (HCS) receives and processes surveillance reports, and flight plan information. The HCS sends search/beacon target, track and flight data, surveillance and alphanumeric weather information, time data, traffic management advisories and lists to the (Display System Replacement) DSR. The HCS associates surveillance-derived tracking information with flight-planning information. The DSR sends requests for flight data, flight data updates, and track control messages to the HCS. HCS-generated display orders are translated for use within the DSR workstation. While radar data processing is distributed among the terminal and En Route computer resources, the HCS performs virtually all of the flight data processing for its entire geographical area of responsibility. Every tower (ATCT) and terminal radar approach control (TRACON) relies exclusively on its parent HCS for flight data.

The HCS also runs algorithms that perform aircraft to aircraft (conflict alert) and aircraft to terrain (Minimum Safe Altitude Warning) separation assurance. The HCS algorithms provide visual and audible alerting to the controller when conflicts are identified.

The HCS presently supplies real time surveillance, flight data and other information to several decision support tools housed in collocated outboard processors connected via two-way high bandwidth links to the HCS and DSR. These are the (User Request Evaluation Tool, (URET), and the Traffic Management Advisory (TMA. URET performs probing of tentative flight plan changes to determine their viability. TMA provides sequencing and spacing information to align the aircraft in En Route airspace for approach.

Low-Density Radio Communications Link

The Low-Density Radio Communications Link (LDRCL) is an FAA owned Low-Density Radio Communications Link (LDRCL) satisfies short-haul, low-density communication requirements. It provides user access (via tail circuits) to a Radio Communications Link (RCL) site or connectivity between two operational facilities

Multi-Mode Digital Radios

Multi-Mode Digital Radios (MDRs) are ground-based Very High Frequency (VHF) air-traffic-control radios that can operate in several configurations: 1) analog voice with 25kHz channel spacing; 2) analog voice with 8.33 kHz channel spacing; and 3) VHF Data Link (VDL) Mode-3 which consists of two-way digital voice and data communication.

New Terminal Radar

The New Terminal Radar (New Terminal Radar) replaces existing terminal radar systems with new radars that incorporates primary and secondary surveillance and Doppler weather radar capability.

Since ADS-B may be used in lieu of secondary surveillance at some locations, the New Terminal Radar will include just the primary surveillance and Doppler weather radar capabilities at those locations. The determination of these locations will depend on the outcome of ADS-B investment decisions, as yet TBD.

Peripheral Adapter Module Replacement Item

The Peripheral Adapter Module Replacement Item (PAMRI) is an interface peripheral to the HOCSR. It provides a conduit through which the HOCSR receives and exchanges data, primarily radar data, flight data and interfacility data. The PAMRI converts communication protocols and translates data formats so the Host and EDARC can communicate with external devices.

Radio Communication Link

Radio Communication Link (RCL) is an integrated voice and data microwave transmission system designed to provide the FAA with cost effective and reliable service for its high capacity NAS communications routes. RCL interconnects air route traffic control center (ARTCC) facilities with long range radar installations and other air traffic control (ATC) facilities.

Radio Control Equipment

Radio Control Equipment (RCE), located at both ATC facilities and remote communication sites, control the operation of remotely located ground to air Very High Frequency/Ultra High Frequency (VHF/UHF) radios used by air traffic controllers to communicate with pilots. RCE interfaces with the voice switch at the ATC facility, telephone landlines, and ground to air radios at the En Route Remote Communications Air/Ground (RCAG) sites, Terminal Remote Transmitter/Receiver (RTR) sites, and Flight Service Station Remote Communications Outlet (RCO) sites.

Satellite Communication Airborne Radios

The Satellite Communication (SATCOM) airborne radios are transceivers installed in commercial, cargo, and military aircraft transiting in the National Airspace System (NAS) and are used as an alternate means of voice communications between pilots in aircraft and ground controllers. These transceivers are typically used in transoceanic applications.

Satellite Communication Ground Radios

Satellite Communications (SATCOM) Ground Radios are transceivers installed at oceanic and en route facilities to support an alternative means of tactical air traffic control (ATC) voice communications between ground controllers and pilots in aircraft. These transceivers are typically used in transoceanic applications. These transceivers are also installed at regional facilities and used as an alternate means of communications in case of total ground communications failure or between locations in mountainous terrain or where other means of communications are not possible (e.g., Alaska).

Oceanic air to ground satellite communications are provided via a communications service provider. The FAA currently has no plans to develop or implement its own air to ground SATCOM ground radios.

Standard Automation Platform Convergence Phase 1

The purpose of Standard Automation Platform Convergence Phase 1 (SAP Conv P1) is to reduce both procurement and recurring costs by standardizing and sharing as many hardware and software ATC Automation components as possible.

An engineering convergence task will begin in fiscal year 2005 and run through 2015. All components from each of the automation systems (STARS, ERAM, TFM, etc.) will be analyzed, and the "best of breed" and "core" components will be selected. SAP convergence will be performed in the following areas: (1) Hardware; (2) System Software (operating systems, Commercial-Off-The-Shelf tools, etc.); (3) ATC applications that can be shared across domains; (4) ATC applications that are unique to a domain; and (5) ATC system support tools that can be shared across domains (adaptation, data extraction or systems analysis recording, data reduction and analysis tools, etc.). Proven STARS and ERAM components will be slected, integrated into the SAP, and rigorously tested for replacing STARS and ERAM components at or near their end of service life.

Prototyping begun under Phase 1 will continue with SAP Conv P2. The results of both efforts will lead to refining the requirements to develop the SAP WS mechanism with SDP and FOMS applications.

Standard Automation Platform Convergence Phase 2

Standard Automation Platform Convergence Phase 2 (SAP Conv P2) continues with prototyping started under Phase 1 to insure that recurring and technical refresh costs for ATC automation elements are minimized by using as many common components as prossible.

SAP Phase 2 incorporates upgrades and technical refreshes of ATC applications, systems software, and hardware to ensure use of common elements across the terminal, enroute, oceanic, command center, and airport surface ATC Automation domains.

Prototyping will conclude with Phase 2, and the results will lead to refining the requirements for development of the SAP WS mechanism with SDP and FOMS applications.

Standard Automation Platform Workstation Phase 1

The SAP consists of the Flight Object Management System (FOMS), the Surveillance Data Processor (SDP), and the SAP Workstation. The SAP will be installed in En Route and Arrival/Departure facilities. The SDP performs surveillance data processing and tracking on Surveillance Data Objects received from the Surveillance Data Network. The FOMS performs flight plan processing, associates flight and track data, and publishes the Flight Object on the System Wide Information Management network. The SAP workstation provides the controller interface for the FOMS and SDP.

Standard Automation Platform Workstation Phase 2

Provides a Technical Refresh of SAP Workstation Phase 1. The SAP consists of the Flight Object Management System (FOMS), the Surveillance Data Processor (SDP), and the SAP Workstation. The SAP will be installed in En Route and Arrival/Departure facilities. The SDP performs surveillance data processing and tracking on Surveillance Data Objects received from the Surveillance Data Network (SDN). The FOMS performs flight plan processing, associates flight and track data, and publishes the Flight Object on the System Wide Information Management network. The SAP workstation provides the controller interface for the FOMS and SDP.

Surveillance Data Network (key system)

National Airspace System (NAS) surveillance systems, including radar and automatic dependent surveillance systems will provide surveillance data objects via the Surveillance Data Network (SDN), which is a sub-network of the System Wide Information Management (SWIM) and the FAA Telecommunication Infrastructure (FTI). The published Surveillance Data Objects (SDO) will be made available to NAS and other users, including the Transportation Security Administration, Department of Defense, and others. Surveillance data availability supports 3-mile separation standards, gate-to-gate traffic management, seamless airspace, and dynamic resectorization. Improved surveillance information is provided in a timely and consistent manner seamlessly across the NAS for operations, planning, and decision making. The information will be available to all users and service providers via SDO in near real time. This information enables decisions to be based on a shared common view of situations, even as conditions are changing. Improved surveillance with SDOs will provide the automation higher quality of data for seamless surveillance and, in combination with other capabilities and new procedures, enable capacity and safety improvements. These benefits accrue from increased situation awareness by decision makers and improved operation of decision support and analysis tools that use surveillance information.

Surveillance Data Processor (key system)

SDP is a component of SAP and operates in En Route and Terminal. The SDP will make improvements to sensors and automation systems that will allow for expanded use of 3-mile separation and terminal procedures. The operational improvements enable more efficient control of aircraft and use of airspace. To accomplish this, all 1030/1090 Beacon interrogators will be upgraded to disseminate their existing 1.2 milli-radian azimuth accuracy and other information, such as time of measurement, confidence, quality, and so on. The automation system algorithms will be improved or new algorithms will be developed to exploit the additional information content of the improved surveillance reports. The method of presentation (display) to support 3-mile separation will be developed and tested to ensure safety. The existing long-range sensor surveillance update period is (12 seconds) and is insufficient to support 3-mile separation. In areas where only long-range sensors exist and where the Air Traffic Service requires 3-mile separation, these sensors may be modified to double the update rate to achieve 3-mile separation.

System Wide Information Management Build 1B (key system)

Build 1B provides all items in 1A, including more NAS information. This build integrates Flight and Surveillance Information systems into the SWIM architecture.

TIS-FIS Broadcast Server (key system)

TIS-FIS Broadcast Servers are located at 22 Air Route Traffic Control Centers and 8 consolidated Terminal Radar Approach Controls/Integrated Control Complex (ICC). TIS-Broadcast (TIS-B) is needed unless full Automatic Dependent Surveillance-Broadcast equipage is achieved. Servers will receive surveillance data (i.e., based on Secondary Surveillance Radar, etc.), from the Surveillance Data Processor (SDP), in the form of Surveillance Data Objects for each target aircraft and will create TIS-B reports. Servers will receive FIS data from weather processors. The TIS and FIS data will be geographically filtered for the defined service volume of each Broadcast Services Ground Station (BSGS), and TIS data will also be filtered for only non-ADS-B-equipped targets.

Ultra High Frequency Airborne Radios

The Ultra High Frequency Avionics (UHF Avionics) are analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225-400 MHz frequency band, which are multi-channel transceivers, installed in an airborne military platform. These airborne devices support the tactical two-way voice communications/ coordination between the military pilot in the military aircraft and the controller on the ground.

Ultra High Frequency Ground Radios

Ultra High Frequency (UHF) Ground Radios are analog UHF amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 Mhz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and flight service station domains.

Ultra High Frequency Ground Radios - Replacement

The Ultra High Frequency Ground Radios - Replacement (UHF Ground Radios - Repl) mechanism represents analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 MHz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and Flight Service Station domains.

Very High Frequency Ground Radios

Very High Frequency (VHF) Ground Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 MHz frequency band which are single-channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the pilot in commercial, cargo, or general aviation aircraft in the oceanic, en route (i.e., ARTCC), terminal (i.e., TRACON/tower), and flight service station domains. Additionally, there are analog VHF frequency modulation (VHF - FM) radio devices operating in the 161 - 174 MHz frequency band that are multi-channel transceivers. These transceivers are used by flight inspection, aviation security, and airway facility specialists supporting local airport operations and maintenance or to perform their operational maintenance mission in support of the NAS. However, these same VHF-FM transceivers are also used to support the resolution of emergency situations or establish a level of voice command and control communications/coordination during disaster recovery.

Very High Frequency Multi-Mode Airborne Radios

Very High Frequency Multi-Mode Airborne Radios (VHF MM Airborne Radios) refers to an airborne radio operating in the very high frequency (VHF) range capable of operating in the following modes: (1)) analog voice (i.e., 25 kHz spacing for use in the United States and other similarly equipped countries); (2) VHF Digital Link Mode 2 (VDL Mode-2) (two-way digital data transmission); (3) VHF Digital Link Mode 3 (VDL Mode-3), (integrated two-way digital voice/data transmission); and (4) analog voice (i.e., 8.33 kHz spacing for use in Europe and other similarly equipped countries).

Voice Switching and Control System

The Voice Switching and Control System (VSCS) is installed in the Air Route Traffic Control Center (ARTCC). The VSCS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The VSCS provides the Air Traffic Control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ARTCC (intercom), interconnectivity between controllers in separate ARTCCs (interphone), and interconnectivity between ARTCC controllers and Terminal Radar Approach Control (TRACON) controllers/Airport Traffic Control Tower (ATCT) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ARTCC controllers and pilots is also supported by the VSCS.

Voice Switching and Control System Modification (Technological Refresh) (key system)

The Tech Refresh for VSCS is a service life extension. The Tech Refresh encompasses workstation upgrade, video display monitor, control equipment power, VSCU supportability, control shelf power supply, and software development demonstration system expansion.

Support Activities

AT Procedure Development for Share Responsibility For Horizontal Separation

Air Traffic Procedures document air traffic services and how they are implemented. The introduction of new systems, or changes to existing systems, may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

AT Training for Share Responsibility For Horizontal Separation

Air Traffic (AT) training is provided to the AT workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AT Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

FAA Rulemaking for Share Responsibility For Horizontal Separation

FAA Rulemaking is necessary when Federal Air Regulations require or change the delivery of NAS services. The regulatory process must be complete prior to implement or service provision. The lead time for change vary greatly due to the varieties of scope but will take a minimum of 180 days before implemented.

Non-FAA Pilot Procedure Development for Share Responsibility For Horizontal Separation

A number of NAS users document the way their activities are to be carried out. The introduction of new systems, or changes to existing systems may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development will generally begin once ATC procedures have been established and be complete by 90 days prior to Initial Operating Capability, in order to facilitate training.

Non-FAA Pilot Training for Share Responsibility For Horizontal Separation

Non-FAA Pilot Training is provided to educate pilots as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional pilot training. Training will generally begin 60 days prior to IOC and be complete within one year following Full Operating Capability.

People

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Planning Controller

A Planning Controller performs the following activities: Ensure separation; Initiate control instructions; Operate interphones; Conduct air/ground communications via data link; Coordinate tactical traffic flows; Scan flight data; Correlate with situation data; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the tactical controller when aware of those instructions.

Radar Associate Controller

A Radar Associate Controller performs the following activities: Ensure separation, initiate control instructions; operate interphones; Accept and initiate non-automated handoffs; and ensure radar controller is made aware of the actions; Assist the radar controller by accepting or initiating automated handoffs/pointouts which are necessary for the continued smooth operation of the sector, and ensure that the radar controller is made immediately aware of any action taken; Coordinate, including pointouts; Monitor radios when not performing higher priority duties; Scan flight progress strips; Correlate with radar data; Manage flight progress strips; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the radar controller when aware of those instructions.

Radar Controller

A Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate automated handoffs; Assist the radar associate controller with non-automated handoff actions when needed; Assist the radar associate controller in coordination when needed; Scan radar display; Correlate with flight progress strip information; Ensure computer entries are completed on instructions or clearances you issue or receive; Ensure strip marking is completed on instructions or clearances you issue or receive.

Radar Coordinator

A Radar Coordinator performs the following activities: Perform interfacility/ intrafacility/sector/controller coordination of traffic actions; Advise the radar controller and the radar associate controller of sector actions required to accomplish overall objectives; Perform any of the functions of the sector team which will assist in meeting situation objectives.

Supervisory Air Traffic Control Specialist

The supervisor is responsible for overall facility operations during an assigned shift. Duties include ensuring adequate staffing for the operational situation, monitoring operational positions, and ensuring functions are performed in accordance with directives.

Tactical Controller

A Tactical Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios and data link; Oversee data link communications by the associate tactical controller; Accept and initiate automated handoffs; Assist the planning controller with non-automated handoff actions when needed; Assist the planning controller in coordination when needed; Scan the situation display; Correlate with flight data; Ensure computer entries are completed on instructions or clearances you issue or receive.

Interfaces

Automatic Dependent Surveillance - Broadcast Avionics ⇐ (Target Data) ➔ Automatic Dependent Surveillance - Broadcast Avionics

Air-to-air ADS-B target data is exchanged between aircraft for use initially as a situation awareness enhancement. This capability will be expanded to other future applications, such as precision approach and landing and self separation.

Automatic Dependent Surveillance - Broadcast Avionics ⇐ (Target Data) ➔ BSGS Broadcast Services Ground Station

The GBT intercepts ADS-B transmissions from aircraft in the coverage area of the GBT. The GBT transmits ADS-B reports it receives down the UAT link back up the 1090 link and vice versa.

Automatic Dependent Surveillance - Broadcast Avionics — (Target Data) ➔ Cockpit Display of Traffic Information Avionics

The ADS-B avionics provides the flight crew surveillance information about other aircraft in the area and is displayed on the CDTI. This information is initially used for enhanced situation awareness and will be expanded to other future applications such as precision approach and landing and self separation.

BSGS Broadcast Services Ground Station — (Weather Data) ➔ Automatic Dependent Surveillance - Broadcast Avionics

ADS-B Avionics (with weather application) can receive FIS weather products broadcasted by the BSGS via an ADS-B data link.

BSGS Broadcast Services Ground Station — (Surveillance Data) ➔ System Wide Information Management Build 1B

The GBT provides ADS-B reports to the SDN for distribution to automation systems and other authorized systems and user.

BSGS Broadcast Services Ground Station ⇐ (Target Data) ➔ TIS-FIS Broadcast Server

The TIS-FIS Broadcast Server exchanges data with the BSGS to form a surveillance broadcast reports, which are then broadcasted to users via the BSGS.

Enhanced Terminal Voice Switch ⇐ (Voice Communication) ➔ Enhanced Terminal Voice Switch

This interface enables ATC voice communication between controllers in same or different facilities.

Enhanced Terminal Voice Switch ⇐ (Voice Communication) ➔ Voice Switching and Control System Modification (Technological Refresh)

This interface enables ATC voice communication between controllers in different facilities.

Surveillance Data Processor — (Surveillance Data) ➔ BSGS Broadcast Services Ground Station

The SDP provides surveillance data for aircraft that are not responding to beacon interrogations or providing ADS-B reports to the GBT for transmission up both the UAT and 1090 links.

Surveillance Data Processor — (Surveillance Data) ➔ TIS-FIS Broadcast Server

Surveillance data reports from the SDP, in the form of surveillance data objects, are sent to the TIS-FIS Broadcast Server to be geographically filtered for the defined service volume of each Broadcast Services Ground Station.

System Wide Information Management Build 1B — (Flight Data) ➔ BSGS Broadcast Services Ground Station

FOMS provides the flight object to the GBT for transmission to aircraft via SWIM.

System Wide Information Management Build 1B — (NAS Status Data) ➔ BSGS Broadcast Services Ground Station

"The GBT receives NAS Status Data, including NOTAMS, via SWIM for broadcast to aircraft equipped with UAT communication equipment.

System Wide Information Management Build 1B — (Surveillance Data) ➔ Surveillance Data Processor

The SDN distributes surveillance data received from various sensors to NAS automation systems.

TIS-FIS Broadcast Server — (Weather Data) ➔ BSGS Broadcast Services Ground Station

FIS graphical weather products from the TIS-FIS Broadcast Server are sent to the BSGS for broadcasting.

Voice Switching and Control System Modification (Technological Refresh) ← (Voice Communication) ➔ Voice Switching and Control System Modification (Technological Refresh)

This interface enables ATC voice communication between controllers in same or different facilities.

Issues

Need concept of use for pilot maintenance of distance with a CDTI thus extending the oceanic procedures into an environment with smaller separation and less structured traffic. Need to evaluate the procedures to see determine if the workload associated with monitoring is less than the current resolution merging procedures – does workload reduce or shift from one task to another

Service Group Air Traffic Services

Service ATC-Separation Assurance

Capability Aircraft to Aircraft Separation Capability

Operational Improvement

Use Data Messaging to Reduce Routine Service Provider Workload And Increase Flight Efficiency (102114)

Enhanced automation and aircraft equipage promote expanded use of data link for additional routine communications between controllers and pilots. Data link usage is also reducing frequency congestion. Using data link, controllers and pilots exchange routine, non-time critical messages, such as transfer of control, more efficiently and accurately.

30-Jun-2015 to 31-Jul-2027

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Enhanced automation and increased aircraft equipage promote expanded use of data link for routine pilot/controller communications. Using NEXCOM, data link capabilities move a subset of pilot/controller voice messages to data messages. Data link is taking an increasing role as an enabling tool towards free flight, which permits more user requested flight profiles to be approved and provides improved handoff procedures. Data link enhancements promote the transition from the current analog voice system to an International Civil Aviation Organization (ICAO) compliant system in which digital communication becomes the alternate and perhaps primary method of routine communication. Although plans for data link include automation-to-automation dialog, as well as the automatic up and downlink of flight information for use by both ground and airborne systems, this operational improvement deals specifically with data link in the domestic En Route and Arrival/Departure Control (ADCON) domains. Data link messages are described in the ATN SARPS Revision 2.0. Data messages are a means of communication between a controller and a pilot via the system wide information management (SWIM) and communications management system (CMS), using data link to transmit and the standard automation platform workstation (SAP WS) to display routine air traffic services communications. Data link uses an open communications network architecture based on the International Standards Organization (ISO) seven-layer protocol definition and is being tailored to the aeronautical environment to guarantee the delivery and security of data link messages.

Benefits

Increased communications accuracy enhances safety with decreased operational errors and improved predictability of flight trajectories. Using data link reduces frequency congestion and provides more timely and efficient delivery of clearances, resulting in increased flight efficiency with less time and fewer miles flown per sector. Reduced voice communications also allows miles-in-trail restrictions to be relaxed, which increases airspace capacity with fewer delays and increased sector-traffic throughput.

Systems

Air Route Surveillance Radar - Model 1E

The Air Route Surveillance Radar - Model 1E (ARSR-1E) is a 1970s analog radar. It is a long-range radar system with a maximum detection range of 200 nm. The ARSR-1E is a surveillance system used to detect azimuth and slant range of en route aircraft operating between terminal areas. It also provides weather intensity data.

Air Route Surveillance Radar - Model 2

The Air Route Surveillance Radar - Model 2 (ARSR-2) is a 1970s analog radar. It is a long-range radar system with a maximum detection range of 200 nm. The ARSR-2 is a surveillance system used to detect azimuth and slant range of en route aircraft operating between terminal areas. It also provides weather intensity data.

Air Route Surveillance Radar - Model 3

The Air Route Surveillance Radar - Model 3 (ARSR-3) is a 1980s radar that provides primary long range surveillance data, including slant range and azimuth data. It processes the returns which includes demodulation, analog-to-digital conversion, moving target indicator function, sensitivity time control, range and azimuth gating, and digital target extraction - all of which are performed digitally (with the exception of the demodulation and analog-to-digital conversion). In addition, the ARSR-3 has a weather channel with associated processing to provide weather contour information in digital format.

Air Route Surveillance Radar - Model 4

The Air Route Surveillance Radar - Model 4 (ARSR-4) is a three-dimensional, long-range, rotating phased array, primary surveillance radar with integrated height finder capability. It is part of the joint surveillance system (JSS) used in conjunction with ARSR-3 coverage as part of the nationwide air defense command surveillance network. In addition to functions peculiar to the military, the ARSR-4 performs the same basic functions of the ARSR-3, by providing primary long-range surveillance data, including slant range and azimuth data.

Air Traffic Control Beacon Interrogator - Model 6

The Air Traffic Control Beacon Interrogator Model 6 (ATCBI-6) is a ground-based system that interrogates transponders, receives and processes replies from transponders, determines the range and azimuth to the aircraft, and forwards the information to appropriate air traffic control (ATC) automation systems. Replies provide identification and altitude data of the transponder.

Airport Surveillance Radar - Model 11

The Airport Surveillance Radar- Model 11 (ASR-11) is a digital, combined primary and secondary surveillance radar (SSR), short-range radar system with a 60 nautical mile (nmi) detection range for medium and small activity airports. The ASR-11 provides advanced digital primary radar including weather intensity surveillance with an integrated monopulse SSR system for use in the airport terminal area. The ASR-11 is used to detect and report the presence and location of an aircraft in a specific volume of airspace. The ASR-11 provides search radar surveillance coverage in controlled airspace primarily in terminal areas.

Airport Surveillance Radar - Model 7

The Airport Surveillance Radar - Model 7 (ASR-7) is a short-range (60 nm) analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the Air Traffic Control Beacon Interrogator - Model 4 or Model 5 (ATCBI-4 or ATCBI-5) or Mode S. This system will be replaced by the ASR-11.

Airport Surveillance Radar - Model 8

The Airport Surveillance Radar - Model 8 (ASR-8) is a short-range (60 nm), analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the Air Traffic Control Beacon Interrogator - Model 4 or Model 5 (ATCBI-4 or ATCBI-5) or Mode S.

Airport Surveillance Radar - Model 9

The Airport Surveillance Radar - Model 9 (ASR-9) is a short range (60 nm) radar system for the airport terminal area. The ASR-9 processes the returns from aircraft targets, which includes demodulation, analog-to-digital conversion, range and azimuth gating, sensitivity timing control, and a moving target detection function. The moving target detector includes two-level weather contour processing, digital signal processing, correlation and interpolation processing, and surveillance processing. The ASR-9 has a separate weather channel with associated processing capable of providing six-level weather contours. The two-level weather contour processing associated with the moving target detector is only be used for backup. The six-level weather channel is primarily used to supplement Next Generation Weather Radar (NEXRAD) coverage. It is normally used in conjunction with Mode Select (Mode S) but it can accommodate an Air Traffic Control Beacon Interrogator Model 4/5 (ATCBI-4/5).

The ASR-9 will be upgraded/replaced with the ASR-9/Mode S SLEP (see separate mechanism) in the 2007-12 time frame.

Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program)

The Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) (ASR-9/Mode S (SLEP)) mechanism provide the necessary technical refresh to extend the service life of the ASR-9 and Mode S through 2030. The ASTERIX upgrade has not been implemented, but will be implemented at a later date.

Automatic Dependent Surveillance (Capstone) Ground Station

The Automatic Dependent Surveillance (Capstone) Ground Station (ADS (Cap) Ground Station) is a demonstration system used by the Capstone project under Safe Flight 21. It receives Global Positioning System (GPS)-derived aircraft four (4)-dimensional position data, aircraft identification, aircraft velocity, and other selected aircraft data for processing at ATC facilities, and transmits Traffic Information System - Broadcast (TIS-B) information on aircraft in areas of radar coverage (and other airspace status information when available) to properly to equipped aircraft, to support operational trials. These ground stations are located in remote locations in Alaska, and feed the Anchorage Air Route Traffic Control Center (ARTCC) automation system.

Automatic Dependent Surveillance - Broadcast (Capstone) Avionics

Automatic Dependent Surveillance - Broadcast (Capstone) Avionics (ADS-B (Cap) Avionics) are the surveillance avionics used by the Capstone project under Safe Flight 21. These are demonstration avionics that are used to support ADS-B-related operational trials in Alaska.

Communications Management System (key system)

The CMS Management and Control function performs tasks for overall management and control of all air/ground and ground/ground voice and data communications to support System Wide Information Management (SWIM). CMS will also incorporate a reconfiguration control function to support reconfigurable airspace assignments, data routing, and a digital recording for both voice and data.

The En Route Automation Modernization program has assumed the data recording function via the Standard Automation Platform, and the Digital Voice Recorder System performs the voice recording function. The CMS routing function is a data router that ensures transport of data communications among Air Traffic Control facilities and users of SWIM. Additionally, CMS integrates functionalities inherently provided by the voice switches, the voice recorders, and the ATN Router.

Digital Airport Surveillance Radar

The Digital Airport Surveillance Radar (DASR) provides advanced digital primary radar including weather intensity surveillance with an integrated mono-pulse Secondary Surveillance Radar (SSR) system for use in the airport terminal area. (Military version of ASR-11)

Digital Voice Recorder System Replacement

The Digital Voice Recorder System Replacement (DVRS Replacement) is a modern digital system used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

En Route Next Generation Secondary Surveillance Radar

En Route Next Generation Secondary Surveillance Radar (En Route (NEXGEN SS-ER)) is a future generation surveillance system capable of providing cooperative surveillance capabilities commensurate with the technology at the time.

Enhanced Terminal Voice Switch

The Enhanced Terminal Voice Switches (ETVS) are installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) facilities with more than four air traffic controller positions. The ETVS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The ETVS (installed in the ATCT) provides the ATC operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the ETVS.

The ETVS (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within a TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the ETVS.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate ETVS systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Fixed Position Surveillance - Model 117

The Fixed Position Surveillance - Model 117 (FPS-117) radar is a joint-use military surveillance system used by the FAA to detect slant range and azimuth of en route aircraft. These radars are located in Alaska (12) and Hawaii (1), and are expected to be sustained until at least 2020.

Fixed Position Surveillance Model 20 Series

The Fixed Position Surveillance Model 20 Series (FPS-20 Series) is a military primary radar of various models (FPS-20A, FPS-64, FPS-66A, FPS-67/A/B, and ARSR-60M) used by the FAA to detect slant range and azimuth of en route aircraft operating between terminals in the continental United States. Each of the different radar models is a similar variation of the original FPS-20 military radar.

Flexible Voice Switch (key system)

Voice communications is the primary means of communications among ATC facilities and between an Air Traffic Control Specialist (ATCS) and a pilot. Voice switching provides the ATCS both G/G Interfacility/Intrafacility and A/G voice communications connectivity. The NAS Voice Switch (NVS) program will replace aging voice switches and their analog interfaces with modern digital voice switches consisting of digital interfaces. The Flexible Voice Switch will be the common platform and baseline voice switch for all NAS domains with modularity and scalability to meet communications connectivity requirements. Additionally, this switch will be expandable to accommodate growth capacity requirements and able to support NAS Modernization needs as described in various Operational Improvements.

Heating, Ventilation and Air Conditioning - Long-Range Radar

The Heating, Ventilation and Air Conditioning - Long-Range Radar (HVAC - LRR) mechanism provides the systems to maintain the temperature and relative humidity within the facility at acceptable levels for LRR system operation or personnel comfort as required. This includes filtering of air to Occupational Safety and Health Administration (OSHA) requirements.

High Frequency Airborne Radios

High Frequency (HF) Airborne Radios are analog (HF multi-channel radio transceivers operating in the 2 - 30 Mhz frequency band installed in airborne commercial, cargo, and military aircraft transiting the oceanic, en route, terminal, or flight service station airspace domains. These transceivers are typically used in transoceanic applications.

High Frequency Ground Radios

High Frequency (HF) Ground Radios are analog HF radio devices operating in the 2 - 30 Mhz frequency band, which may be single channel transmitters and receivers or multi-channel transceivers. These radio devices are installed at oceanic and en route facilities and used to support tactical air traffic control (ATC) voice communications between a ground controller and a pilot in an aircraft in the oceanic domain. Additionally, these devices are also installed at regional facilities and used to support voice command and control communications /coordination in emergency or during disaster recovery situations occurring in the NAS.

Low-Density Radio Communications Link

The Low-Density Radio Communications Link (LDRCL) is an FAA owned Low-Density Radio Communications Link (LDRCL) satisfies short-haul, low-density communication requirements. It provides user access (via tail circuits) to a Radio Communications Link (RCL) site or connectivity between two operational facilities

Multi-Mode Digital Radios

Multi-Mode Digital Radios (MDRs) are ground-based Very High Frequency (VHF) air-traffic-control radios that can operate in several configurations: 1) analog voice with 25kHz channel spacing; 2) analog voice with 8.33 kHz channel spacing; and 3) VHF Data Link (VDL) Mode-3 which consists of two-way digital voice and data communication.

New Terminal Radar

The New Terminal Radar (New Terminal Radar) replaces existing terminal radar systems with new radars that incorporates primary and secondary surveillance and Doppler weather radar capability.

Since ADS-B may be used in lieu of secondary surveillance at some locations, the New Terminal Radar will include just the primary surveillance and Doppler weather radar capabilities at those locations. The determination of these locations will depend on the outcome of ADS-B investment decisions, as yet TBD.

Radio Communication Link

Radio Communication Link (RCL) is an integrated voice and data microwave transmission system designed to provide the FAA with cost effective and reliable service for its high capacity NAS communications routes. RCL interconnects air route traffic control center (ARTCC) facilities with long range radar installations and other air traffic control (ATC) facilities.

Radio Control Equipment

Radio Control Equipment (RCE), located at both ATC facilities and remote communication sites, control the operation of remotely located ground to air Very High Frequency/Ultra High Frequency (VHF/UHF) radios used by air traffic controllers to communicate with pilots. RCE interfaces with the voice switch at the ATC facility, telephone landlines, and ground to air radios at the En Route Remote Communications Air/Ground (RCAG) sites, Terminal Remote Transmitter/Receiver (RTR) sites, and Flight Service Station Remote Communications Outlet (RCO) sites.

Satellite Communication Airborne Radios

The Satellite Communication (SATCOM) airborne radios are transceivers installed in commercial, cargo, and military aircraft transiting in the National Airspace System (NAS) and are used as an alternate means of voice communications between pilots in aircraft and ground controllers. These transceivers are typically used in transoceanic applications.

Satellite Communication Ground Radios

Satellite Communications (SATCOM) Ground Radios are transceivers installed at oceanic and en route facilities to support an alternative means of tactical air traffic control (ATC) voice communications between ground controllers and pilots in aircraft. These transceivers are typically used in transoceanic applications. These transceivers are also installed at regional facilities and used as an alternate means of communications in case of total ground communications failure or between locations in mountainous terrain or where other means of communications are not possible (e.g., Alaska).

Oceanic air to ground satellite communications are provided via a communications service provider. The FAA currently has no plans to develop or implement its own air to ground SATCOM ground radios.

Standard Automation Platform Convergence Phase 1 (key system)

The purpose of Standard Automation Platform Convergence Phase 1 (SAP Conv P1) is to reduce both procurement and recurring costs by standardizing and sharing as many hardware and software ATC Automation components as possible.

An engineering convergence task will begin in fiscal year 2005 and run through 2015. All components from each of the automation systems (STARS, ERAM, TFM, etc.) will be analyzed, and the "best of breed" and "core" components will be selected. SAP convergence will be performed in the following areas: (1) Hardware; (2) System Software (operating systems, Commercial-Off-The-Shelf tools, etc.); (3) ATC applications that can be shared across domains; (4) ATC applications that are unique to a domain; and (5) ATC system support tools that can be shared across domains (adaptation, data extraction or systems analysis recording, data reduction and analysis tools, etc.). Proven STARS and ERAM components will be slected, integrated into the SAP, and rigorously tested for replacing STARS and ERAM components at or near their end of service life.

Prototyping begun under Phase 1 will continue with SAP Conv P2. The results of both efforts will lead to refining the requirements to develop the SAP WS mechanism with SDP and FOMS applications.

Standard Automation Platform Convergence Phase 2

Standard Automation Platform Convergence Phase 2 (SAP Conv P2) continues with prototyping started under Phase 1 to insure that recurring and technical refresh costs for ATC automation elements are minimized by using as many common components as prossible.

SAP Phase 2 incorporates upgrades and technical refreshes of ATC applications, systems software, and hardware to ensure use of common elements across the terminal, enroute, oceanic, command center, and airport surface ATC Automation domains.

Prototyping will conclude with Phase 2, and the results will lead to refining the requirements for development of the SAP WS mechanism with SDP and FOMS applications.

Standard Automation Platform Workstation Phase 1 (key system)

The SAP consists of the Flight Object Management System (FOMS), the Surveillance Data Processor (SDP), and the SAP Workstation. The SAP will be installed in En Route and Arrival/Departure facilities. The SDP performs surveillance data processing and tracking on Surveillance Data Objects received from the Surveillance Data Network. The FOMS performs flight plan processing, associates flight and track data, and publishes the Flight Object on the System Wide Information Management network. The SAP workstation provides the controller interface for the FOMS and SDP.

Standard Automation Platform Workstation Phase 2

Provides a Technical Refresh of SAP Workstation Phase 1. The SAP consists of the Flight Object Management System (FOMS), the Surveillance Data Processor (SDP), and the SAP Workstation. The SAP will be installed in En Route and Arrival/Departure facilities. The SDP performs surveillance data processing and tracking on Surveillance Data Objects received from the Surveillance Data Network (SDN). The FOMS performs flight plan processing, associates flight and track data, and publishes the Flight Object on the System Wide Information Management network. The SAP workstation provides the controller interface for the FOMS and SDP.

System Wide Information Management Build 1B (key system)

Build 1B provides all items in 1A, including more NAS information. This build integrates Flight and Surveillance Information systems into the SWIM architecture.

Ultra High Frequency Airborne Radios

The Ultra High Frequency Avionics (UHF Avionics) are analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225-400 MHz frequency band, which are multi-channel transceivers, installed in an airborne military platform. These airborne devices support the tactical two-way voice communications/ coordination between the military pilot in the military aircraft and the controller on the ground.

Ultra High Frequency Ground Radios

Ultra High Frequency (UHF) Ground Radios are analog UHF amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 Mhz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and flight service station domains.

Ultra High Frequency Ground Radios - Replacement

The Ultra High Frequency Ground Radios - Replacement (UHF Ground Radios - Repl) mechanism represents analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 MHz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and Flight Service Station domains.

Very High Frequency Ground Radios

Very High Frequency (VHF) Ground Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 MHz frequency band which are single-channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the pilot in commercial, cargo, or general aviation aircraft in the oceanic, en route (i.e., ARTCC), terminal (i.e., TRACON/tower), and flight service station domains. Additionally, there are analog VHF frequency modulation (VHF - FM) radio devices operating in the 161 - 174 MHz frequency band that are multi-channel transceivers. These transceivers are used by flight inspection, aviation security, and airway facility specialists supporting local airport operations and maintenance or to perform their operational maintenance mission in support of the NAS. However, these same VHF-FM transceivers are also used to support the resolution of emergency situations or establish a level of voice command and control communications/coordination during disaster recovery.

Very High Frequency Multi-Mode Airborne Radios

Very High Frequency Multi-Mode Airborne Radios (VHF MM Airborne Radios) refers to an airborne radio operating in the very high frequency (VHF) range capable of operating in the following modes: (1)) analog voice (i.e., 25 kHz spacing for use in the United States and other similarly equipped countries); (2) VHF Digital Link Mode 2 (VDL Mode-2) (two-way digital data transmission); (3) VHF Digital Link Mode 3 (VDL Mode-3), (integrated two-way digital voice/data transmission); and (4) analog voice (i.e., 8.33 kHz spacing for use in Europe and other similarly equipped countries).

Voice Switching and Control System

The Voice Switching and Control System (VSCS) is installed in the Air Route Traffic Control Center (ARTCC). The VSCS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The VSCS provides the Air Traffic Control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ARTCC (intercom), interconnectivity between controllers in separate ARTCCs (interphone), and interconnectivity between ARTCC controllers and Terminal Radar Approach Control (TRACON) controllers/Airport Traffic Control Tower (ATCT) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ARTCC controllers and pilots is also supported by the VSCS.

Support Activities

AT Procedure Development for Use Data Messaging to Reduce Routine Service Provider Workload And Increase Flight Efficiency

Air Traffic Procedures document air traffic services and how they are implemented. The introduction of new systems, or changes to existing systems, may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

AT Training for Use Data Messaging to Reduce Routine Service Provider Workload and Increase Flight Efficiency

Air Traffic (AT) training is provided to the AT workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AT Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

FAA Certification for Use Data Messaging to Reduce Routine Service Provider Workload And Increase Flight Efficiency

FAA certification is an activity necessary to support people and systems in the delivery of NAS services. Avionics and associated systems are deemed to be critical to the safety of flight and must be certificated. In addition certain operators and service providers require to be certified such as pilots, dispatchers and others. Certification will generally begin 24 months prior to Initial Operating Capability, and be complete prior to receiving or giving service.

Non-FAA Pilot Procedure Development for Use Data Messaging to Reduce Routine Service Provider Workload And Increase Flight Efficiency

A number of NAS users document the way their activities are to be carried out. The introduction of new systems, or changes to existing systems may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development will generally begin once ATC procedures have been established and be complete by 90 days prior to Initial Operating Capability, in order to facilitate training.

Non-FAA Pilot Training for Use Data Messaging to Reduce Routine Service Provider Workload And Increase Flight Efficiency

Non-FAA Pilot Training is provided to educate pilots as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional pilot training. Training will generally begin 60 days prior to IOC and be complete within one year following Full Operating Capability.

People

Non-Radar Controller

A Non-Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate transfer of control, communications, and flight data; Ensure computer entries are completed on instructions or clearances issued or received; Ensure strip marking is completed on instructions or clearances issued or received.

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Planning Controller

A Planning Controller performs the following activities: Ensure separation; Initiate control instructions; Operate interphones; Conduct air/ground communications via data link; Coordinate tactical traffic flows; Scan flight data; Correlate with situation data; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the tactical controller when aware of those instructions.

Radar Associate Controller

A Radar Associate Controller performs the following activities: Ensure separation, initiate control instructions; operate interphones; Accept and initiate non-automated handoffs; and ensure radar controller is made aware of the actions; Assist the radar controller by accepting or initiating automated handoffs/pointouts which are necessary for the continued smooth operation of the sector, and ensure that the radar controller is made immediately aware of any action taken; Coordinate, including pointouts; Monitor radios when not performing higher priority duties; Scan flight progress strips; Correlate with radar data; Manage flight progress strips; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the radar controller when aware of those instructions.

Radar Controller

A Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate automated handoffs; Assist the radar associate controller with non-automated handoff actions when needed; Assist the radar associate controller in coordination when needed; Scan radar display; Correlate with flight progress strip information; Ensure computer entries are completed on instructions or clearances you issue or receive; Ensure strip marking is completed on instructions or clearances you issue or receive.

Tactical Controller

A Tactical Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios and data link; Oversee data link communications by the associate tactical controller; Accept and initiate automated handoffs; Assist the planning controller with non-automated handoff actions when needed; Assist the planning controller in coordination when needed; Scan the situation display; Correlate with flight data; Ensure computer entries are completed on instructions or clearances you issue or receive.

Interfaces

Communications Management System ⇜ (Data Communication) ➔ Communications Management System

Controllers in the same or different facilities communicate via CMS.

Communications Management System ⇜ (Voice Communication) ➔ Communications Management System

Controllers in the same or different facilities communicate via CMS.

System Wide Information Management Build 1B — (Data Communication) ➔ Communications Management System

Pilots can access data available on SWIM via radios and CMS.

System Wide Information Management Build 1B — (Weather Data) ➔ Standard Automation Platform Workstation Phase 1

The SAP WS receives weather data from SWIM for display to controllers.

Issues

Need to consider the roles and responsibilities in separation assurance versus strategic flow when voice is not required to change trajectories. Not applicable Need to consider the role of TMU for strategic adjustments and the role separation assurance and clearances. Need to develop a concept of use for data messaging that includes its role in separation assurance as well as/differentiating from delivery of other ATM services.

Service Group Air Traffic Services

Service ATC-Separation Assurance

Capability Aircraft to Aircraft Separation Capability

Operational Improvement

Use Oceanic Pairwise Maneuvers And Flexible Entry Points to Increase Tactical Capacity (102108)

Improved oceanic surveillance information, satellite-based communications, and data link provide the opportunity to reduce longitudinal and lateral spacing for aircraft to aircraft separation in oceanic airspace. Improved automation increases the separation assurance coverage area in the oceanic domain based on aircraft transmission of position, velocity, and intent information. Technology improvements support multiple entry points into the oceanic tracks relieving congestion at established gateways.

30-Jun-2015 to 31-Jan-2024

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Increased tactical capacity and access include use of multiple entry points into the oceanic tracks. The entry points are negotiated with users as a point in space with a required time of arrival. Decision support systems (DSS) using the Integrated Information Workstation help monitor the progress of each flight and expected conformance to the agreed track based on up linked Automatic Dependent Surveillance-Addressable (ADS-A) position reports. Improved surveillance provides the opportunity for pilots to apply airborne separation assurance services when operationally advantageous for climbs, descents, crossing, and merging routes. The Enhanced Advanced Technologies and Oceanic Procedures modernization of the oceanic air traffic control (ATC) capability and increased equipage will allow for this service enhancement. This is done on a pair wise basis and only in oceanic, non radar airspace. Each aircraft must have ADS - Broadcast (ADS-B), a Cockpit Display of Traffic Information (CDTI) system based on ADS-B, and air-to-air VHF communications. The situation display shows traffic based on local ADS-B broadcasts. Controllers will have the normal extrapolated periodic position report data, which may consist of pilot reports or ADS-A depending on aircraft equipage, and the pilot's view of traffic supplements the controller's picture of the longer-term traffic flow. The controller's role is to make sure that both aircraft are eligible to implement airborne separation assurance services based on equipage, geometry, pilot training, and other factors, and to provide the results of his/her conflict probe capability.

The in trail climb (ITC) and in trail descent (ITD) maneuvers often occur in conjunction with mid-flight route changes (crossing, merging, etc.) and are enabled by Dynamic Aircraft Route Planning. ATC performs a conflict probe before clearing the maneuver. Other aircraft in the surrounding airspace, not just the maneuvering aircraft, are equipped with the Future Air Navigation System to support an accurate and timely conflict probe capability. As various oceanic airspace enhancements come online, it is necessary to look at them collectively, rather than individually, because of their interaction. Additional Minimum Navigation Performance Specification-type airspace is established to accommodate all of these enhancements, and determines aircraft equipment requirements. In a more sophisticated concept, controllers have a monitoring responsibility based on ADS-A using both periodic and (deviation) event contracts. Prepackaged maneuvers may be stored in the Aircraft Flight Management System or Airline Operations Center-prepared auto load maneuvers. The separation required for the maneuver is based on aircraft equipage, the role of the controller, and the ADS report periodic rate, or some combination of these elements and the sophistication of pilot/controller DSSs.

Benefits

Within the tracks, aircraft will be able to move to and fill the most advantageous flight positions with the climb/descend and pass maneuvers. Flexible entries into the tracks will allow the aircraft to fly minimum time/fuel path from gate to gate and not just within the track system.

Systems

Advanced Technologies and Oceanic Procedures (key system)

Advanced Technologies and Oceanic Procedures (ATOP) is a Non-Developmental Item (NDI) automation, communications, training, maintenance, installation, transition, and procedures development support acquisition. It will provide a Flight Data Processing (FDP) capability fully integrated with Surveillance Data Processing (SDP). The SDP will be capable of processing primary and secondary radar, Automatic Dependent Surveillance (ADS, both Addressable: ADS-A and Broadcast: ADS-B), Controller Pilot Data Link Communications (CPDLC) position reports, and relayed High Frequency (HF) radio voice pilot position reports from an HF radio operator employed by a communications service provider under contract to the FAA. ATOP will support radar and non-radar procedural separation, tracking clearances issued via CPDLC or messages through the HF radio service provider, conflict detection/prediction capabilities through the use of controller tools (Conflict Alert and Minimum Safe Altitude Warning for radar airspace and Conflict Probe for non-radar procedural separation applications), and fully automated coordination via Air traffic services Inter-facility Data Communications System (AIDCS) with AIDCS equipped adjacent Flight Information Regions (FIRs) . The ATOP inter-facility data communications system will be capable of supporting the ICAO air traffic services message set. ATOP supports operations in which the information and primary capabilities required for the controller to maintain situational awareness and provide procedural separation services are available on the display (rather than paper flight strips).

Advanced Technologies and Oceanic Procedures Controller Work Station (key system)

The Advanced Technologies and Oceanic Procedures Controller Work Station (ATOP Controller WS). The ATOP Controller Workstation is part of a non-developmental item (NDI) automation, training, maintenance, installation, transition, and procedures development support acquisition. The workstation will interface with the integrated Flight Data Processing (FDP). The workstation will contain displays for information from primary and secondary radar, Automatic Dependent Surveillance (ADS), Controller Pilot Data Link Communications (CPDLC) position reports, and relayed pilot reports from High Frequency (HF) voice service provider. The ATOP workstation will support radar and non-radar procedural separation, tracking clearances issued via CPDLC or messages through the HF radio service provider, conflict detection/prediction capabilities through the use of controller tools, and coordination via Air Traffic Services Interfacility Data Communications System (AIDCS). Additionally, it is expected to support operations in which the information and primary capabilities required for the controller to maintain situational awareness and provide procedural separation services are available on the display (rather than paper flight strips).

Air Route Surveillance Radar - Model 1E

The Air Route Surveillance Radar - Model 1E (ARSR-1E) is a 1970s analog radar. It is a long-range radar system with a maximum detection range of 200 nm. The ARSR-1E is a surveillance system used to detect azimuth and slant range of en route aircraft operating between terminal areas. It also provides weather intensity data.

Air Route Surveillance Radar - Model 2

The Air Route Surveillance Radar - Model 2 (ARSR-2) is a 1970s analog radar. It is a long-range radar system with a maximum detection range of 200 nm. The ARSR-2 is a surveillance system used to detect azimuth and slant range of en route aircraft operating between terminal areas. It also provides weather intensity data.

Air Route Surveillance Radar - Model 3

The Air Route Surveillance Radar - Model 3 (ARSR-3) is a 1980s radar that provides primary long range surveillance data, including slant range and azimuth data. It processes the returns which includes demodulation, analog-to-digital conversion, moving target indicator function, sensitivity time control, range and azimuth gating, and digital target extraction - all of which are performed digitally (with the exception of the demodulation and analog-to-digital conversion). In addition, the ARSR-3 has a weather channel with associated processing to provide weather contour information in digital format.

Air Route Surveillance Radar - Model 4

The Air Route Surveillance Radar - Model 4 (ARSR-4) is a three-dimensional, long-range, rotating phased array, primary surveillance radar with integrated height finder capability. It is part of the joint surveillance system (JSS) used in conjunction with ARSR-3 coverage as part of the nationwide air defense command surveillance network. In addition to functions peculiar to the military, the ARSR-4 performs the same basic functions of the ARSR-3, by providing primary long-range surveillance data, including slant range and azimuth data.

Air Traffic Control Beacon Interrogator - Model 6

The Air Traffic Control Beacon Interrogator Model 6 (ATCBI-6) is a ground-based system that interrogates transponders, receives and processes replies from transponders, determines the range and azimuth to the aircraft, and forwards the information to appropriate air traffic control (ATC) automation systems. Replies provide identification and altitude data of the transponder.

Automatic Dependent Surveillance - Addressable Avionics (key system)

Automatic Dependent Surveillance - Addressable Avionics (ADS-A Avionics) are devices that upon reception of messages specifically addressed to the aircraft, compose and transmit a message specifically addressed to the interrogator, containing the current position of the aircraft as determined by on-board navigation equipment, the aircraft identification, and the short term planned course changes. A specific form of ADS, designed to support oceanic aeronautical operations, based on one-to-one communications between aircraft providing ADS information and a ground facility requiring receipt of ADS reports.

Automatic Dependent Surveillance - Broadcast (Capstone) Avionics

Automatic Dependent Surveillance - Broadcast (Capstone) Avionics (ADS-B (Cap) Avionics) are the surveillance avionics used by the Capstone project under Safe Flight 21. These are demonstration avionics that are used to support ADS-B-related operational trials in Alaska.

Automatic Dependent Surveillance - Broadcast Avionics

Automatic Dependent Surveillance-Broadcast Avionics (ADS-B Avionics) transmits and receives Global Positioning System (GPS)-derived aircraft 4-dimensional position data, aircraft identification, aircraft velocity, and other selected aircraft data. Augmented GPS data may be required for certain applications. This is intended to be a surveillance system and not an avoidance system. The broadcast of own position is automatic and is intended to provide surveillance information to other users. The aircraft or vehicle originating the broadcast may not have knowledge of which users are receiving its broadcast. The ADS-B avionics are designed to transmit this 4-dimensional position data of own aircraft or vehicle and to also receive same type of information from others that are similarly equipped to receive and process ADS-B surveillance information.

Digital Voice Recorder System

Provides modern digital voice recording devices used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

In Feburary 2004, the DVRS was upgraded with a 24-channel card, which replaced the 16-channel card. This minor upgrade, called DVR II, was not extended to the systems installed prior to February 2004.

Digital Voice Recorder System Replacement

The Digital Voice Recorder System Replacement (DVRS Replacement) is a modern digital system used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

Emergency Voice Communications System

The Emergency Voice Communications System (EVCS) is located at Headquarters (HQ), Regional Offices, several Air Route Traffic Control Centers (ARTCCs), Terminal Radar Approach Control (TRACON) facilities, and other selected sites. EVCS uses two (2) dedicated Federal Telecommunications Service 2001 (FTS2001) dial access channels at most FAA locations. Dedicated dial lines using the Public Switched Telephone Network (PSTN) are used at locations not having direct access to FTS2001. Supports HQ and Regional Communications Command Centers'' functions for accident and incident reports, hijacks, aircraft crashes, aviation security matters, military activities, natural disasters, etc.

Enhanced Back-up Surveillance

The Enhanced Back-Up Surveillance (EBUS) system replaces the DARC system in use at the 20 Air Route Traffic Control Centers (ARTCC) in the contiguous United States (CONUS), the William J. Hughes Technical Center (WJHTC), and the FAA Academy (FAAAC). The EBUS design employs the existing FAA-certified software of the Microprocessor En Route Automated Radar Tracking System (Micro-EARTS) application to provide radar data processing (RDP) services for the replacement legacy backup system. Micro-EARTS provides key capabilities not supported by the DARC legacy system it replaces, among which are the safety functions of Conflict Alert (CA), Mode-C Intruder (MCI), and Minimum Safe Altitude Warning (MSAW). EBUS also provides Next Generation Radar (NEXRAD) weather data to R-position users via the DSR Backup Communications Network (BCN). EBUS makes the R-position functionality on the backup channel more comparable to that of the primary channel.

The EBUS software (Micro EARTS) and the ECG backup gateway software will share the same hardware platform such that both software functions will reside in the same ECG backup gateway hardware platform.

Enhanced-Advanced Technologies and Oceanic Procedures (key system)

E-ATOP will provide and manage automation and information to control Oceanic air traffic. E-ATOP will facilitate seamless aircraft transitions and data transfers between domestic and oceanic airspace.

Fixed Position Surveillance - Model 117

The Fixed Position Surveillance - Model 117 (FPS-117) radar is a joint-use military surveillance system used by the FAA to detect slant range and azimuth of en route aircraft. These radars are located in Alaska (12) and Hawaii (1), and are expected to be sustained until at least 2020.

Fixed Position Surveillance Model 20 Series

The Fixed Position Surveillance Model 20 Series (FPS-20 Series) is a military primary radar of various models (FPS-20A, FPS-64, FPS-66A, FPS-67/A/B, and ARSR-60M) used by the FAA to detect slant range and azimuth of en route aircraft operating between terminals in the continental United States. Each of the different radar models is a similar variation of the original FPS-20 military radar.

Flexible Voice Switch (key system)

Voice communications is the primary means of communications among ATC facilities and between an Air Traffic Control Specialist (ATCS) and a pilot. Voice switching provides the ATCS both G/G Interfacility/Intrafacility and A/G voice communications connectivity. The NAS Voice Switch (NVS) program will replace aging voice switches and their analog interfaces with modern digital voice switches consisting of digital interfaces. The Flexible Voice Switch will be the common platform and baseline voice switch for all NAS domains with modularity and scalability to meet communications connectivity requirements. Additionally, this switch will be expandable to accommodate growth capacity requirements and able to support NAS Modernization needs as described in various Operational Improvements.

Flight Data Input/Output

The Flight Data Input/Output (FDIO) system provides flight progress information for use by the Tower, Terminal Radar Approach Control (TRACON) and Air Route Traffic Control Center (ARTCC) controllers. The FDIO system allows Air Traffic Control (ATC) Specialists to input automated flight data, perform data manipulation, and print flight strips.

Flight Management System

Flight Management System (FMS) is a computer system that uses a large database to allow routes to be preprogrammed and stored. The system is constantly updated with respect to position accuracy by reference to one or more conventional radio navigation aids (i.e., multi-sensor systems). The system may also use information from an inertial reference unit (IRU) or from a stand-alone inertial navigation system (INS). A sophisticated program and its associated database ensure that the most appropriate navaids are automatically selected during the update cycle. FMSs combine the relative position information from two or more point-referenced navigation aids such as VOR or DME to determine the absolute position of the aircraft (latitude, longitude). The resulting Area Navigation (RNAV) capability permits operation on any desired course.

Future Air Navigation System 1/A (key system)

The Future Air Navigation System (FANS) is based on the International Civil Aviation Organization□s (ICAO) concept of a phased approach to implementing a modern, satellite-based, global Communication, Navigation, Surveillance/ Air Traffic Management (CNS/ATM) system. The following aircraft avionics are required to support an initial FANS implementation. These functions are referred to as FANS-1; the French developed equivalent for the Airbus A-330/340 is called FANS-A: Automatic Dependent Surveillance (ADS), ATC Data link, Airline Operational Control Data Link, Global Positioning System (GPS.

The FANS operational environment extends beyond the aircraft to include satellite, ground-based receiver/transmit stations, and a controller/pilot datalink system.

FANS 1/A consists of three message applications: AFN (ATS Facility Notification for logon to ATC via data link), ADS (Automatic Dependent Surveillance), CPDLC (Controller Pilot Data Link Communications). FANS 1/A uses the existing ACARS air/ground network to carry data link messages to/from the aircraft.

FANS 1 (Boeing implementation) was first certified in June of 1995 for use in the South Pacific. Oakland, Fiji, Aukland, and

Brisbane FIRs were the initial participants for CPDLC using Inmarsat satcom. The latter three FIRs also used ADS for surveillance.

"The OEP identifies the ATOP program for implementation of FANS 1/A in Oakland, Anchorage and NY FIRs beginning in 2003." There are approximately 1000 FANS 1/A equipped aircraft in service as of mid-2002. All long-range model commercial transport aircraft have FANS 1 or FANS A either as standard equipment or as an option. In oceanic and remote areas, where FANS 1/A is currently in use, the Inmarsat geosynchronous satellite constellation provides the air/ground data link. HF data link will undergo trials as a FANS 1/A air/ground data link in late 2002-2003.

Global Positioning System

The Global Positioning System (GPS) is a worldwide, all-weather, satellite-based navigation system developed, maintained & operated by the U.S Department of Defense, and managed by an Interagency executive board. GPS is a (nominal) 24 satellite constellation orbiting at approximately 12,000 miles above the earth in six planes. Each satellite broadcasts a precisely timed L-band signal on the same frequency. User GPS receivers, oboard aircraft, in ground vehicles or hand-held, receive and process the signals from all satellites in view, with a minimum of four satellites necessary to determine the receiver''s three-dimensional position (i.e., latitude, longitude and altitude), velocity (if applicable) and the precise time of day. GPS equipped aircraft can navigate on published jetways or utilize Area Navigation (RNAV) to fly any desired course between two locations.

GPS avionics built to TSO C-129 support en route and terminal area navigation, as well as non-precision instrument approach operations. Approval has been granted for properly certified GPS avionics to be used as a primary means of navigation in oceanic airspace and in certain remote areas. In July 2003 the Wide Area Augmentation System (WAAS)was commissioned to augment the GPS signal to meet primary navigation service requirements for accuracy, coverage, availability, and integrity.

Global Positioning System Avionics

Global Positioning System (GPS) Avionics process the signals received from four or more GPS satellites and determine the three-dimensional position (i.e., latitude, longitude and altitude) and velocity of an aircraft, as well as the precise time of day. GPS avionics provide an Area Navigation (RNAV) capability that permits operation on any desired course.

GPS avionics built to TSO-C129 do not have augmentation (WAAS, LAAS) and are approved only as a supplemental navigation system in the NAS, meaning that they must be used in conjunction with a primary navigation system. TSO-C129 avionics support en route and terminal area navigation, as well as non-precision instrument approach operations. Approval has been granted for properly certified GPS avionics to be used as a primary means of navigation in oceanic airspace and in certain remote areas. In certain regions of the world (including the NAS), GPS will be augmented (Wide Area and Local Area systems) to satisfy additional requirements for accuracy, coverage, availability, and integrity. Augmented GPS avionics (WAAS, LAAS) are expected to support precision instrument approach operations, and to gain approval as a primary navigation system throughout the NAS. It is anticipated that users will migrate from TSO-C129 avionics to augmented GPS avionics (WAAS, LAAS).

Heating, Ventilation and Air Conditioning - Long-Range Radar

The Heating, Ventilation and Air Conditioning - Long-Range Radar (HVAC - LRR) mechanism provides the systems to maintain the temperature and relative humidity within the facility at acceptable levels for LRR system operation or personnel comfort as required. This includes filtering of air to Occupational Safety and Health Administration (OSHA) requirements.

High Frequency Airborne Radios

High Frequency (HF) Airborne Radios are analog (HF multi-channel radio transceivers operating in the 2 - 30 Mhz frequency band installed in airborne commercial, cargo, and military aircraft transiting the oceanic, en route, terminal, or flight service station airspace domains. These transceivers are typically used in transoceanic applications.

High Frequency Ground Radios

High Frequency (HF) Ground Radios are analog HF radio devices operating in the 2 - 30 Mhz frequency band, which may be single channel transmitters and receivers or multi-channel transceivers. These radio devices are installed at oceanic and en route facilities and used to support tactical air traffic control (ATC) voice communications between a ground controller and a pilot in an aircraft in the oceanic domain. Additionally, these devices are also installed at regional facilities and used to support voice command and control communications /coordination in emergency or during disaster recovery situations occurring in the NAS.

Host Computer System / Oceanic Computer System Replacement

The Host Computer System & Oceanic Computer System Replacement (HCS/OCSR--HOCSR) was implemented because of potential Y2K hardware issues with previous hardware. Accordingly, HCS/OCSR provided a new hardware platform, new peripherals (printers and Keyboard Display Video Terminals--KVDT), a new Direct Access Storage Device (DASD), and new OS-370 software extensions to control the new hardware using legacy NAS software applications. Hardware was replaced in both the En Route and Anchorage Oceanic automation environments. HCS/OCSR did not modify the legacy software functions of either the HCS system (e.g., flight data processing, radar data processing) or the Ocean Display and Planning System (ODAPS) automation systems (e.g., filght data processing). Likewise, HCS/OCSR did not impact HID NAS LAN, URET, DSR or PAMRI.

Phase 1 and 2 (mainframe and software extension replacements) were completed prior to 2000. Phase 3 (DASD replacement) was completed in 2003. Phase 4 (peripheral replacement) will be completed in 2004. Enhancement planned for 2005 and beyond were cancelled as they are overtaken by ERAM. Each phase has its own waterfall, and consequently no waterfall can be provided in the Location section below.

Low-Density Radio Communications Link

The Low-Density Radio Communications Link (LDRCL) is an FAA owned Low-Density Radio Communications Link (LDRCL) satisfies short-haul, low-density communication requirements. It provides user access (via tail circuits) to a Radio Communications Link (RCL) site or connectivity between two operational facilities

Microprocessor-En Route Automated Radar Tracking System

The Microprocessor-En Route Automated Radar Tracking System (Micro-EARTS) is a radar processing system implemented with Commercial Off-the-Shelf (COTS) equipment, for use in both En Route and Terminal environments. It provides single sensor and a mosaic display of traffic and weather using long- and short-range radars. At Anchorage, Alaska, Micro-EARTS also provides Automatic Dependent Surveillance-Broadcast (ADS-B) surveillance and display. Micro-EARTS interfaces with multiple types of displays, including Display System Replacement (DSR), Digital Bright Radar Indicator Tower Equipment (DBRITE), and the flat panel tower controller displays.

Multi-Mode Digital Radios

Multi-Mode Digital Radios (MDRs) are ground-based Very High Frequency (VHF) air-traffic-control radios that can operate in several configurations: 1) analog voice with 25kHz channel spacing; 2) analog voice with 8.33 kHz channel spacing; and 3) VHF Data Link (VDL) Mode-3 which consists of two-way digital voice and data communication.

Multi-Sector Oceanic Data Link

Multi-sector Oceanic Data Link System (MSODL) supports air-ground data link communications and extends single sector data link functionality to all Oceanic Display and Planning System (ODAPS) sector positions. Oceanic Data Link (ODL) gives controllers two-way electronic communications with aircraft equipped with data link. The technology is designed to reduce/eliminate the need for voice communication thus improving the reliability and timeliness of message delivery. The ODL provides a means to automatically check pending clearances for conflicts, while enabling flight crews automatically to load flight clearances into the Flight Management System (FMS). The ODL also gives controllers an integrated interface with the flight data processor (FDP). It also addresses problems with the existing high-frequency (HF) communications with aircraft, such as frequency congestion, transcription errors and lack of timeliness.

New Terminal Radar

The New Terminal Radar (New Terminal Radar) replaces existing terminal radar systems with new radars that incorporates primary and secondary surveillance and Doppler weather radar capability.

Since ADS-B may be used in lieu of secondary surveillance at some locations, the New Terminal Radar will include just the primary surveillance and Doppler weather radar capabilities at those locations. The determination of these locations will depend on the outcome of ADS-B investment decisions, as yet TBD.

Power System - Long-Range Radar

The Power System - Long-Range Radar (Pwr Sys - LRR) mechanism provides conditioning of commercial power, including uninterruptible power systems (UPS), to eliminate voltage dropouts, surges, and voltage sags caused by sources outside the facility. Power distribution, grounding, bonding and shielding of electrical system within the facility is also part of the Pwr Sys - LRR.

Radio Communication Link

Radio Communication Link (RCL) is an integrated voice and data microwave transmission system designed to provide the FAA with cost effective and reliable service for its high capacity NAS communications routes. RCL interconnects air route traffic control center (ARTCC) facilities with long range radar installations and other air traffic control (ATC) facilities.

Radio Control Equipment

Radio Control Equipment (RCE), located at both ATC facilities and remote communication sites, control the operation of remotely located ground to air Very High Frequency/Ultra High Frequency (VHF/UHF) radios used by air traffic controllers to communicate with pilots. RCE interfaces with the voice switch at the ATC facility, telephone landlines, and ground to air radios at the En Route Remote Communications Air/Ground (RCAG) sites, Terminal Remote Transmitter/Receiver (RTR) sites, and Flight Service Station Remote Communications Outlet (RCO) sites.

Satellite Communication Airborne Radios

The Satellite Communication (SATCOM) airborne radios are transceivers installed in commercial, cargo, and military aircraft transiting in the National Airspace System (NAS) and are used as an alternate means of voice communications between pilots in aircraft and ground controllers. These transceivers are typically used in transoceanic applications.

Standard Automation Platform Convergence Phase 1 (key system)

The purpose of Standard Automation Platform Convergence Phase 1 (SAP Conv P1) is to reduce both procurement and recurring costs by standardizing and sharing as many hardware and software ATC Automation components as possible.

An engineering convergence task will begin in fiscal year 2005 and run through 2015. All components from each of the automation systems (STARS, ERAM, TFM, etc.) will be analyzed, and the "best of breed" and "core" components will be selected. SAP convergence will be performed in the following areas: (1) Hardware; (2) System Software (operating systems, Commercial-Off-The-Shelf tools, etc.); (3) ATC applications that can be shared across domains; (4) ATC applications that are unique to a domain; and (5) ATC system support tools that can be shared across domains (adaptation, data extraction or systems analysis recording, data reduction and analysis tools, etc.). Proven STARS and ERAM components will be slected, integrated into the SAP, and rigorously tested for replacing STARS and ERAM components at or near their end of service life.

Prototyping begun under Phase 1 will continue with SAP Conv P2. The results of both efforts will lead to refining the requirements to develop the SAP WS mechanism with SDP and FOMS applications.

Standard Automation Platform Workstation Phase 1 (key system)

The SAP consists of the Flight Object Management System (FOMS), the Surveillance Data Processor (SDP), and the SAP Workstation. The SAP will be installed in En Route and Arrival/Departure facilities. The SDP performs surveillance data processing and tracking on Surveillance Data Objects received from the Surveillance Data Network. The FOMS performs flight plan processing, associates flight and track data, and publishes the Flight Object on the System Wide Information Management network. The SAP workstation provides the controller interface for the FOMS and SDP.

Standard Terminal Automation Replacement System at Offshore Facilities

The Standard Terminal Automation Replacement System at Offshore Facilities (STARS Offshore) will replace the Microprocessor-En Route Automated Radar Tracking System (MicroEARTS) radar processing system functionality and provide limited flight data processing. STARS provides the capability to implement the following enhancements: improved radar processing, Global Positioning System (GPS) compatibility, adaptive routing, Center Terminal Radar Approach Control (TRACON) Automation System (CTAS), data link implementation, improved weather display, and better utilization of traffic management information. This is a joint procurement with the U.S. Department of Defense (DoD) and will achieve a common baseline for the FAA and DoD systems. STARS Preplanned Product Improvements (P3I) will upgrade the capabilities of STARS.

Surveillance Data Network (key system)

National Airspace System (NAS) surveillance systems, including radar and automatic dependent surveillance systems will provide surveillance data objects via the Surveillance Data Network (SDN), which is a sub-network of the System Wide Information Management (SWIM) and the FAA Telecommunication Infrastructure (FTI). The published Surveillance Data Objects (SDO) will be made available to NAS and other users, including the Transportation Security Administration, Department of Defense, and others. Surveillance data availability supports 3-mile separation standards, gate-to-gate traffic management, seamless airspace, and dynamic resectorization. Improved surveillance information is provided in a timely and consistent manner seamlessly across the NAS for operations, planning, and decision making. The information will be available to all users and service providers via SDO in near real time. This information enables decisions to be based on a shared common view of situations, even as conditions are changing. Improved surveillance with SDOs will provide the automation higher quality of data for seamless surveillance and, in combination with other capabilities and new procedures, enable capacity and safety improvements. These benefits accrue from increased situation awareness by decision makers and improved operation of decision support and analysis tools that use surveillance information.

Surveillance Data Processor (key system)

SDP is a component of SAP and operates in En Route and Terminal. The SDP will make improvements to sensors and automation systems that will allow for expanded use of 3-mile separation and terminal procedures. The operational improvements enable more efficient control of aircraft and use of airspace. To accomplish this, all 1030/1090 Beacon interrogators will be upgraded to disseminate their existing 1.2 milli-radian azimuth accuracy and other information, such as time of measurement, confidence, quality, and so on. The automation system algorithms will be improved or new algorithms will be developed to exploit the additional information content of the improved surveillance reports. The method of presentation (display) to support 3-mile separation will be developed and tested to ensure safety. The existing long-range sensor surveillance update period is (12 seconds) and is insufficient to support 3-mile separation. In areas where only long-range sensors exist and where the Air Traffic Service requires 3-mile separation, these sensors may be modified to double the update rate to achieve 3-mile separation.

Ultra High Frequency Airborne Radios

The Ultra High Frequency Avionics (UHF Avionics) are analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225-400 MHz frequency band, which are multi-channel transceivers, installed in an airborne military platform. These airborne devices support the tactical two-way voice communications/ coordination between the military pilot in the military aircraft and the controller on the ground.

Ultra High Frequency Ground Radios

Ultra High Frequency (UHF) Ground Radios are analog UHF amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 Mhz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and flight service station domains.

Ultra High Frequency Ground Radios - Replacement

The Ultra High Frequency Ground Radios - Replacement (UHF Ground Radios - Repl) mechanism represents analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 MHz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and Flight Service Station domains.

Very High Frequency Airborne Radios

Very High Frequency (VHF) Airborne Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 Mhz frequency band which are multi-channel transceivers installed in an airborne platform (e.g., commercial, cargo, and general aviation aircraft). These airborne devices support the tactical two-way voice communications/coordination between the pilot in the aircraft and the controller on the ground.

Very High Frequency Ground Radios

Very High Frequency (VHF) Ground Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 MHz frequency band which are single-channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the pilot in commercial, cargo, or general aviation aircraft in the oceanic, en route (i.e., ARTCC), terminal (i.e., TRACON/tower), and flight service station domains. Additionally, there are analog VHF frequency modulation (VHF - FM) radio devices operating in the 161 - 174 MHz frequency band that are multi-channel transceivers. These transceivers are used by flight inspection, aviation security, and airway facility specialists supporting local airport operations and maintenance or to perform their operational maintenance mission in support of the NAS. However, these same VHF-FM transceivers are also used to support the resolution of emergency situations or establish a level of voice command and control communications/coordination during disaster recovery.

Very High Frequency Multi-Mode Airborne Radios

Very High Frequency Multi-Mode Airborne Radios (VHF MM Airborne Radios) refers to an airborne radio operating in the very high frequency (VHF) range capable of operating in the following modes: (1)) analog voice (i.e., 25 kHz spacing for use in the United States and other similarly equipped countries); (2) VHF Digital Link Mode 2 (VDL Mode-2) (two-way digital data transmission); (3) VHF Digital Link Mode 3 (VDL Mode-3), (integrated two-way digital voice/data transmission); and (4) analog voice (i.e., 8.33 kHz spacing for use in Europe and other similarly equipped countries).

Voice Switching and Control System

The Voice Switching and Control System (VSCS) is installed in the Air Route Traffic Control Center (ARTCC). The VSCS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The VSCS provides the Air Traffic Control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ARTCC (intercom), interconnectivity between controllers in separate ARTCCs (interphone), and interconnectivity between ARTCC controllers and Terminal Radar Approach Control (TRACON) controllers/Airport Traffic Control Tower (ATCT) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ARTCC controllers and pilots is also supported by the VSCS.

Voice Switching and Control System Modification (Technological Refresh) (key system)

The Tech Refresh for VSCS is a service life extension. The Tech Refresh encompasses workstation upgrade, video display monitor, control equipment power, VSCU supportability, control shelf power supply, and software development demonstration system expansion.

Voice Switching and Control System Training and Backup Switches

Voice Switching and Control System Training and Backup Switch (VTABS) was developed to meet AT requirements for a separate standalone VSCS Backup and Training System. VTABS can be configured as a 50-position switch with the capability to support air traffic operations in the event of VSCS failure, hardware and software maintenance or power loss.

Support Activities

AT Procedure Development for Use Oceanic Pairwise Maneuvers And Flexible Entry Points to Increase Tactical Capacity

Air Traffic Procedures document air traffic services and how they are implemented. The introduction of new systems, or changes to existing systems, may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

AT Training for Use Oceanic Pairwise Maneuvers And Flexible Entry Points to Increase Tactical Capacity

Air Traffic (AT) training is provided to the AT workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AT Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

FAA Certification for Use Oceanic Pairwise Maneuvers And Flexible Entry Points to Increase Tactical Capacity

FAA certification is an activity necessary to support people and systems in the delivery of NAS services. Avionics and associated systems are deemed to be critical to the safety of flight and must be certificated. In addition certain operators and service providers require to be certified such as pilots, dispatchers and others. Certification will generally begin 24 months prior to Initial Operating Capability, and be complete prior to receiving or giving service.

FAA Rulemaking for Use Oceanic Pairwise Maneuvers And Flexible Entry Points to Increase Tactical Capacity

FAA Rulemaking is necessary when Federal Air Regulations require or change the delivery of NAS services. The regulatory process must be complete prior to implement or service provision. The lead time for change vary greatly due to the varieties of scope but will take a minimum of 180 days before implemented.

FAA Standards for Use Oceanic Pairwise Maneuvers And Flexible Entry Points to Increase Tactical Capacity

FAA standards development is an activity necessary to support people and systems in the delivery of NAS services. FAA Standards establish rules for the measure of quantity, weight, extent, value, or quality.

Non-FAA Pilot Procedure Development for Use Oceanic Pairwise Maneuvers And Flexible Entry Points to Increase Tactical Capacity

A number of NAS users document the way their activities are to be carried out. The introduction of new systems, or changes to existing systems may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development will generally begin once ATC procedures have been established and be complete by 90 days prior to Initial Operating Capability, in order to facilitate training.

Non-FAA Pilot Training for Use Oceanic Pairwise Maneuvers And Flexible Entry Points to Increase Tactical Capacity

Non-FAA Pilot Training is provided to educate pilots as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional pilot training. Training will generally begin 60 days prior to IOC and be complete within one year following Full Operating Capability.

People

Non-Radar Controller

A Non-Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate transfer of control, communications, and flight data; Ensure computer entries are completed on instructions or clearances issued or received; Ensure strip marking is completed on instructions or clearances issued or received.

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Planning Controller

A Planning Controller performs the following activities: Ensure separation; Initiate control instructions; Operate interphones; Conduct air/ground communications via data link; Coordinate tactical traffic flows; Scan flight data; Correlate with situation data; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the tactical controller when aware of those instructions.

Supervisory Air Traffic Control Specialist

The supervisor is responsible for overall facility operations during an assigned shift. Duties include ensuring adequate staffing for the operational situation, monitoring operational positions, and ensuring functions are performed in accordance with directives.

Tactical Controller

A Tactical Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios and data link; Oversee data link communications by the associate tactical controller; Accept and initiate automated handoffs; Assist the planning controller with non-automated handoff actions when needed; Assist the planning controller in coordination when needed; Scan the situation display; Correlate with flight data; Ensure computer entries are completed on instructions or clearances you issue or receive.

Interfaces

Surveillance Data Processor — (Surveillance Data) → Standard Automation Platform Workstation Phase 1

The SDP sends surveillance data to the SAP WS for display to the controller.

Voice Switching and Control System Modification (Technological Refresh) ← (Voice Communication) → Voice Switching and Control System Modification (Technological Refresh)

This interface enables ATC voice communication between controllers in same or different facilities.

Issues

Need to link the flight planning functions of domestic automation and ATOP to accurately project the trajectory to the entry point. Need to link the Traffic Synchronization with ocean control so that the aircraft can be managed to ocean transition and entry with minimal impact on flow while meeting the flight objectives of the oceanic fligh

Service Group Air Traffic Services

Service ATC-Separation Assurance

Capability Aircraft-Terrain-Obstacles

Operational Improvement

Current Aircraft To Terrain / Obstacle Separation (102201)

Separation services ensure that aircraft maintain a safe distance from terrain and obstacles. Aircraft positions are derived from navigational systems, surveillance information, visual orientation, and position reports to ensure that an aircraft's trajectory remains a minimum safe distance from terrain and obstacles.

01-Jan-2007 to 31-Jul-2008

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Aircraft are separated from the ground (terrain) and from obstacles to ensure safe operations. The pilot is responsible for aircraft flying Visual Flight Rules (VFR). The controller and the pilot share responsibility for aircraft flying Instrument Flight Rules (IFR). For IFR separation, there are procedures for both radar and non radar application. Airspace and approaches are designed to ensure terrain and obstacle separation. Automated systems aboard aircraft and at controller workstations provide alarm when separation is below defined safety criteria.

The Obstruction Evaluation/Airspace and Airport Analysis system provides automated tools and processes to enable the FAA regions to screen and track the status of over 17,000 obstruction evaluation notices annually, perform airport/airspace analyses, and maintain information on obstructions, airports, air navigation facilities, and communications facilities. Flight data and radar data support separation services between aircraft and terrain/obstacles airspace. These are both primary and backup systems. If automation is not available, through system failure or at non automated facilities, manual procedures can be used to provide separation services. Air/ground radio communications are used to relay clearance instructions and amendments to aircraft. Ground/ground communications are used to coordinate airspace status and to relay control instructions through other facilities.

Separation standards are published rules that must be adhered to and maintained. Vertical separation from terrain and obstacles is 1,000 feet. Over mountainous areas the separation is increased to 2,000 feet. Radar separation is 3 or 5 nautical miles, depending on the distance from the radar site and whether the site is single-source-adapted. The obstruction must be on the radar display to allow the controller to use radar separation. The depiction can be on the map data or can be a transponder attached to the obstruction, which is displayed to the controller as a secondary radar target.

FAA computer systems that are able to process Mode C radar data have software that alerts the controller to any aircraft that is reported below a minimum safe altitude. Minimum Safe Altitude Warning, En Route Minimum Safe Altitude Warning, and Low Altitude Alert System software give the controller visual alerts when certain parameters are met. Certain aircraft are equipped to receive data from radar altimeters and Global Positioning Satellite receivers. This data provides detection and alert to pilots of low-altitude occurrences. Some aircraft have with a Terrain Awareness and Warning System, which accepts position data from the position calculator function (navigation avionics), detects possible terrain collisions, and sends warning alerts to the flight crew via the aircraft's audio and display systems.

Benefits

Current operations are provided in the NAS.

Systems

Air Route Surveillance Radar - Model 1E (key system)

The Air Route Surveillance Radar - Model 1E (ARSR-1E) is a 1970s analog radar. It is a long-range radar system with a maximum detection range of 200 nm. The ARSR-1E is a surveillance system used to detect azimuth and slant range of en route aircraft operating between terminal areas. It also provides weather intensity data.

Air Route Surveillance Radar - Model 2 (key system)

The Air Route Surveillance Radar - Model 2 (ARSR-2) is a 1970s analog radar. It is a long-range radar system with a maximum detection range of 200 nm. The ARSR-2 is a surveillance system used to detect azimuth and slant range of en route aircraft operating between terminal areas. It also provides weather intensity data.

Air Route Surveillance Radar - Model 3 (key system)

The Air Route Surveillance Radar - Model 3 (ARSR-3) is a 1980s radar that provides primary long range surveillance data, including slant range and azimuth data. It processes the returns which includes demodulation, analog-to-digital conversion, moving target indicator function, sensitivity time control, range and azimuth gating, and digital target extraction - all of which are performed digitally (with the exception of the demodulation and analog-to-digital conversion). In addition, the ARSR-3 has a weather channel with associated processing to provide weather contour information in digital format.

Air Route Surveillance Radar - Model 4 (key system)

The Air Route Surveillance Radar - Model 4 (ARSR-4) is a three-dimensional, long-range, rotating phased array, primary surveillance radar with integrated height finder capability. It is part of the joint surveillance system (JSS) used in conjunction with ARSR-3 coverage as part of the nationwide air defense command surveillance network. In addition to functions peculiar to the military, the ARSR-4 performs the same basic functions of the ARSR-3, by providing primary long-range surveillance data, including slant range and azimuth data.

Air Traffic Control Beacon Interrogator - Model 4 (key system)

The Air Traffic Control Beacon Interrogator - Model 4 (ATCBI-4) is an air traffic control (ATC) beacon system that interrogates transponder-equipped aircraft. It is a secondary radar system that interrogates transponders, receives aircraft identification, and determines position data.

Air Traffic Control Beacon Interrogator - Model 5 (key system)

The Air Traffic Control Beacon Interrogator - Model 5 (ATCBI-5) is an air traffic control (ATC) beacon system that interrogates transponder-equipped aircraft. It is a secondary radar system that interrogates transponders, receives aircraft identification, and determines position data.

Air Traffic Control Beacon Interrogator - Model 6 (key system)

The Air Traffic Control Beacon Interrogator Model 6 (ATCBI-6) is a ground-based system that interrogates transponders, receives and processes replies from transponders, determines the range and azimuth to the aircraft, and forwards the information to appropriate air traffic control (ATC) automation systems. Replies provide identification and altitude data of the transponder.

Airport Movement Area Safety System (key system)

The Airport Movement Area Safety System (AMASS) with Airport Surface Detection Equipment (ASDE) provides controllers with automatically generated visual and aural alerts of potential runway incursions and other potential unsafe conditions. AMASS includes the Terminal Automation Interface Unit (TAIU) that processes arrival data from the airport surveillance radar. AMASS adds an automation enhancement to the ASDE-3 and tracks the movement of aircraft and ground vehicles on the airport surface and presents the data to the tower controllers via the ASDE display.

Airport Surface Detection Equipment - Model 3 (key system)

Airport Surface Detection Equipment - Model 3 (ASDE-3) provides primary radar surveillance of aircraft and airport service vehicles on the surface movement area. ASDE-3 is installed at the busiest U.S. airports. Radar monitoring of airport surface operations (ground movements of aircraft and other supporting vehicles) provides an effective means of directing and moving surface traffic. This is especially important during periods of low visibility such as rain, fog, and night operations.

The ASDE-3 will undergo a SLEP to extend its service life through 2015 (see ASDE-3 SLEP), which will enable it to more effectively support AMASS (see) through this same time period.

Airport Surveillance Radar - Model 11 (key system)

The Airport Surveillance Radar- Model 11 (ASR-11) is a digital, combined primary and secondary surveillance radar (SSR), short-range radar system with a 60 nautical mile (nmi) detection range for medium and small activity airports. The ASR-11 provides advanced digital primary radar including weather intensity surveillance with an integrated monopulse SSR system for use in the airport terminal area. The ASR-11 is used to detect and report the presence and location of an aircraft in a specific volume of airspace. The ASR-11 provides search radar surveillance coverage in controlled airspace primarily in terminal areas.

Airport Surveillance Radar - Model 7 (key system)

The Airport Surveillance Radar - Model 7 (ASR-7) is a short-range (60 nm) analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the Air Traffic Control Beacon Interrogator - Model 4 or Model 5 (ATCBI-4 or ATCBI-5) or Mode S. This system will be replaced by the ASR-11.

Airport Surveillance Radar - Model 8 (key system)

The Airport Surveillance Radar - Model 8 (ASR-8) is a short-range (60 nm), analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the Air Traffic Control Beacon Interrogator - Model 4 or Model 5 (ATCBI-4 or ATCBI-5) or Mode S.

Airport Surveillance Radar - Model 9 (key system)

The Airport Surveillance Radar - Model 9 (ASR-9) is a short range (60 nm) radar system for the airport terminal area. The ASR-9 processes the returns from aircraft targets, which includes demodulation, analog-to-digital conversion, range and azimuth gating, sensitivity timing control, and a moving target detection function. The moving target detector includes two-level weather contour processing, digital signal processing, correlation and interpolation processing, and surveillance processing. The ASR-9 has a separate weather channel with associated processing capable of providing six-level weather contours. The two-level weather contour processing associated with the moving target detector is only be used for backup. The six-level weather channel is primarily used to supplement Next Generation Weather Radar (NEXRAD) coverage. It is normally used in conjunction with Mode Select (Mode S) but it can accommodate an Air Traffic Control Beacon Interrogator Model 4/5 (ATCBI-4/5).

The ASR-9 will be upgraded/replaced with the ASR-9/Mode S SLEP (see separate mechanism) in the 2007-12 time frame.

Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) (key system)

The Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) (ASR-9/Mode S (SLEP)) mechanism provide the necessary technical refresh to extend the service life of the ASR-9 and Mode S through 2030. The ASTERIX upgrade has not been implemented, but will be implemented at a later date.

Airport Surveillance Radar, Military (key system)

The GPN-20 radar is a military short-range (60 nm) analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the TPX-42 military beacon (interrogate friend or foe, IFF). The GPN-20 is the military version of the FAAs ASR-7/8.

Automated Radar Terminal System - Model IIE (key system)

The Automated Radar Terminal System - Model IIE (ARTS IIE) provides radar data processing (RDP) and decision support tools to the controller in the terminal environment. Utilized at low to medium-size Terminal Radar Control (TRACONs) Facilities the ARTS IIE is capable of receiving input from up to 2 sensors, can process up to 256 tracks simultaneously, and support up to 22 displays. The ARTS IIE implements the Common ARTS software for improved performance maintenance efficiency. The radar data processing (RDP) software provides automated surveillance tracking and display processing. Included in the ARTS IIE software are decision support tools such as Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Mode C intruder alert, Converging Runway Display Aid (CRDA), and Controller Automation Spacing Aid (CASA).

Automated Radar Terminal System - Model IIIA (key system)

The Automated Radar Terminal System - Model IIIA (ARTS IIIA) provides radar data processing (RDP) and decision support tools to the controller in the terminal environment. Utilized at larger airports, ARTS IIIA is capable of receiving input from up to three sensors, can process up to 900 tracks simultaneously and support up to 36 displays. The RDP software provides automated surveillance tracking and display processing. Included in the ARTS IIIA software are decision support tools such as Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Mode C intruder alert, Converging Runway Display Aid (CRDA), Final Monitor Aid (FMA), and controller automation spacing aid.

Automated Radar Terminal System - Model IIIE (key system)

The Automated Radar Terminal System - Model IIIE (ARTS IIIE) consists of the hardware platform and software required providing radar data processing (RDP) and decision support tools to the controller in the terminal environment. The ARTS

IIIE is used at consolidated Terminal Radar Approach Control (TRACON) facilities. The Common ARTS program provided an ARTS IIIE capable of receiving input from up to 15 sensors, the ability to process up to 10,000 tracks simultaneously, and support up to 223 displays. The RDP software provides automated surveillance tracking and display processing including mosaic display of radar data. Included in the ARTS IIIE software are decision support tools such as Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Mode C intruder alert, Converging Runway Display Aid (CRDA), Final Monitor Aid (FMA), and controller automation spacing aid.

Automated Radar Terminal System Color Display (key system)

The Automated Radar Terminal System (ARTS) Color Display (ACD) is a high performance, full function, color display that replaces the Full Digital ARTS Display (FDAD) and the Data Entry and Display Subsystem (DEDS). The ACD supports keyboard and trackball functions for the ARTS IIA, ARTS IIE, and ARTS IIIE. A primary and secondary radar data path to the ACD is provided by a radar gateway function incorporated in the event of a failure of either the ARTS IIE and ARTS IIIA processing systems.

Automated Radar Terminal System Software

Provides maintenace of the Automated Radar Terminal System Software (ARTS S/W) for ARTS IIE, ARTS IIIA and ARTS IIIE. Functions include radar data processing (RDP), Minimum Safe Altitude Warning (MSAW); controller automated spacing tool, Converging Runway Display Aid (CRDA), Final Approach Monitor (FMS), and other tools to assist the terminal and tower controllers to manage the air traffic in the terminal area.

Automated Radar Terminal System Software Modification (All Purpose Structured Eurocontrol Information Exchange, etc,)

Automated Radar Terminal System Software Modification (All Purpose Structured Eurocontrol Information Exchange (ASTERIX), etc,), (ARTS S/W Mod (ASTERIX, etc)). Modification to the ARTS software that will add capabilities including weather product integration on the displays, processing of ASTERIX formatted surveillance data, improved traffic management and surveillance data processing, Ground-Initiated Communications Broadcast (GICB), and terminal data link functionality.

Automatic Dependent Surveillance (Capstone) Ground Station

The Automatic Dependent Surveillance (Capstone) Ground Station (ADS (Cap) Ground Station) is a demonstration system used by the Capstone project under Safe Flight 21. It receives Global Positioning System (GPS)-derived aircraft four (4)-dimensional position data, aircraft identification, aircraft velocity, and other selected aircraft data for processing at ATC facilities, and transmits Traffic Information System - Broadcast (TIS-B) information on aircraft in areas of radar coverage (and other airspace status information when available) to properly to equipped aircraft, to support operational trials. These ground stations are located in remote locations in Alaska, and feed the Anchorage Air Route Traffic Control Center (ARTCC) automation system.

Automatic Dependent Surveillance (Safe Flight 21) Ground Station

The Automatic Dependent Surveillance (Safe Flight 21) Ground Station (ADS (SF-21) Ground Station) is a demonstration system used by the Ohio Valley project under the Safe Flight 21 program. It receives Global Positioning System (GPS)-derived aircraft four (4)-dimensional position data, aircraft identification, aircraft velocity, and other selected aircraft data for processing at selected ATC facilities, and transmits Traffic Information System - Broadcast (TIS-B) information on aircraft in areas of radar coverage (and other airspace status information when available) to properly to equipped aircraft, to support SF-21 operational trials. These ground stations will be located in the regions surrounding Memphis, TN and Louisville, KY, and interface with developmental surveillance processing systems.

Automatic Dependent Surveillance - Broadcast (Capstone) Avionics

Automatic Dependent Surveillance - Broadcast (Capstone) Avionics (ADS-B (Cap) Avionics) are the surveillance avionics used by the Capstone project under Safe Flight 21. These are demonstration avionics that are used to support ADS-B-related operational trials in Alaska.

Digital Airport Surveillance Radar (key system)

The Digital Airport Surveillance Radar (DASR) provides advanced digital primary radar including weather intensity surveillance with an integrated mono-pulse Secondary Surveillance Radar (SSR) system for use in the airport terminal area. (Military version of ASR-11)

Digital Bright Radar Indicator Tower Equipment

The Digital Bright Radar Indicator Tower Equipment (DBRITE) is a tower display system that provides a raster scan presentation of radar/beacon videos and automation system alphanumeric data. The system accepts radar, beacon, external map, analog data, and automation system data.

Digital Voice Recorder System (key system)

Provides modern digital voice recording devices used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

In Feburary 2004, the DVRS was upgraded with a 24-channel card, which replaced the 16-channel card. This minor upgrade, called DVR II, was not extended to the systems installed prior to February 2004.

Digital Voice Recorder System Replacement

The Digital Voice Recorder System Replacement (DVRS Replacement) is a modern digital system used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

Direct Access Radar Channel

The Direct Access Radar Channel (DARC) provides a back-up processing path to provide surveillance data to the displays in the event of a primary channel (Host Computer System (HCS) failure. The DARC path is a physically, logically and electrically separate processing path (with diverse hardware and software) from the primary Host Computer System (HCS) Radar Data Processing (RDP) paths. Thus DARC provides a tertiary path, to keep radar data on the controller"s displays, should both HCS RDP paths be disabled for any reason. The DARC provides radar data processing, very limited flight data processing, but with significantly less functionality than the HCS. Basically, DARC serves as a lifeboat should both HCS processing paths become disabled.

Display System Replacement (key system)

The Display System Replacement (DSR) provides continuous real-time, automated support to air traffic controllers for the display of surveillance, flight data and other critical control information. This information is processed by the Host and Oceanic Computer System Replacement (HOCSR) and the Enhanced Direct Access Radar Channel (EDARC) subsystems. The DSR provides controller workstations, displays, and input/output devices and a communications infrastructure to connect the DSR with external processing elements of the en route ATC automation system.

Emergency Voice Communications System (key system)

The Emergency Voice Communications System (EVCS) is located at Headquarters (HQ), Regional Offices, several Air Route Traffic Control Centers (ARTCCs), Terminal Radar Approach Control (TRACON) facilities, and other selected sites. EVCS uses two (2) dedicated Federal Telecommunications Service 2001 (FTS2001) dial access channels at most FAA locations. Dedicated dial lines using the Public Switched Telephone Network (PSTN) are used at locations not having direct access to FTS2001. Supports HQ and Regional Communications Command Centers'' functions for accident and incident reports, hijacks, aircraft crashes, aviation security matters, military activities, natural disasters, etc.

En Route Communications Gateway

The En Route Communications Gateway (ECG) replaces PAMRI and provides a modernized LAN-based infrastructure capable of accommodating ERAM with minimal modifications. The PAMRI functions to be replaces include providing communications interfaces to external systems located in other ARTCCs, TRACONs, AFSSs, ATCSCC, NORAD, US Law Enforcement, US Customs, Military Base Operations, and international ACCs. Other interfaces include the FDIO Central Control Unit, which exchanges FDIO data with FAA and DOD facilities, and the NADIN Concentrator, which exchanges data through the NADIN PSN with the the M1FC via WMSCR. ECG increases the number of external interfaces to radars from 24 to 36. ECG provides internal interfaces between HCS and DARC (or EBUS) and between HCS and traffic flow processors such as ETMS and DSP. ECG includes a Monitor and Control subsystem and a display for monitoring up to two dozen radars--called the Random Access Plan Position Indicator (RAPPI).

The operational components of ECG consist of a front end processor (communications and surveillance interfaces), two gateway processors (internal connectivity to HCS and DARC/EBUS), and separate LANs that communicate between the front end and gateway processors on the primary channel and between the front end and gateway processors on the backup channel. The primary data path, consisting of the ECG primary gateway and the HCS, operate on separate hardware platforms. However, the backup data path, consisting of the ECG backup gateway and the EBUS, will operate on the same hardware platform--the ECG gateway platform. This processor, with both functions performed therein, is renamed to the Backup Interface Processor (BIP). In essence, a single processor operates on the backup channel, supporting both the ECG gateway function and the EBUS function. These two functions will remain, however, as two mechanisms in the NAS architecture.

Enhanced Back-up Surveillance

The Enhanced Back-Up Surveillance (EBUS) system replaces the DARC system in use at the 20 Air Route Traffic Control Centers (ARTCC) in the contiguous United States (CONUS), the William J. Hughes Technical Center (WJHTC), and the FAA Academy (FAAAC). The EBUS design employs the existing FAA-certified software of the Microprocessor En Route Automated Radar Tracking System (Micro-EARTS) application to provide radar data processing (RDP) services for the replacement legacy backup system. Micro-EARTS provides key capabilities not supported by the DARC legacy system it replaces, among which are the safety functions of Conflict Alert (CA), Mode-C Intruder (MCI), and Minimum Safe Altitude Warning (MSAW). EBUS also provides Next Generation Radar (NEXRAD) weather data to R-position users via the DSR Backup Communications Network (BCN). EBUS makes the R-position functionality on the backup channel more comparable to that of the primary channel.

The EBUS software (Micro EARTS) and the ECG backup gateway software will share the same hardware platform such that both software functions will reside in the same ECG backup gateway hardware platform.

Enhanced Terminal Voice Switch (key system)

The Enhanced Terminal Voice Switches (ETVS) are installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) facilities with more than four air traffic controller positions. The ETVS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The ETVS (installed in the ATCT) provides the ATC operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the ETVS.

The ETVS (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within a TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the ETVS.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate ETVS systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Fixed Position Surveillance - Model 117

The Fixed Position Surveillance - Model 117 (FPS-117) radar is a joint-use military surveillance system used by the FAA to detect slant range and azimuth of en route aircraft. These radars are located in Alaska (12) and Hawaii (1), and are expected to be sustained until at least 2020.

Fixed Position Surveillance Model 20 Series

The Fixed Position Surveillance Model 20 Series (FPS-20 Series) is a military primary radar of various models (FPS-20A, FPS-64, FPS-66A, FPS-67/A/B, and ARSR-60M) used by the FAA to detect slant range and azimuth of en route aircraft operating between terminals in the continental United States. Each of the different radar models is a similar variation of the original FPS-20 military radar.

Full Digital Automated Radar Terminal System Display (key system)

Full Digital ARTS Display (FDAD) is the fully digital ARTS display system that provides the display and data input devices for terminal controllers using ARTS IIIE and ARTS IIIA. The FDAD can work in analog video time share mode or full digital mode. The present application is analog video time share mode.

Heating, Ventilation and Air Conditioning - Long-Range Radar (key system)

The Heating, Ventilation and Air Conditioning - Long-Range Radar (HVAC - LRR) mechanism provides the systems to maintain the temperature and relative humidity within the facility at acceptable levels for LRR system operation or personnel comfort as required. This includes filtering of air to Occupational Safety and Health Administration (OSHA) requirements.

High Frequency Airborne Radios (key system)

High Frequency (HF) Airborne Radios are analog (HF multi-channel radio transceivers operating in the 2 - 30 Mhz frequency band installed in airborne commercial, cargo, and military aircraft transiting the oceanic, en route, terminal, or flight service station airspace domains. These transceivers are typically used in transoceanic applications.

Host Computer System (key system)

The Host Computer System (HCS) receives and processes surveillance reports, and flight plan information. The HCS sends search/beacon target, track and flight data, surveillance and alphanumeric weather information, time data, traffic management advisories and lists to the (Display System Replacement) DSR. The HCS associates surveillance-derived tracking information with flight-planning information. The DSR sends requests for flight data, flight data updates, and track control messages to the HCS. HCS-generated display orders are translated for use within the DSR workstation. While radar data processing is distributed among the terminal and En Route computer resources, the HCS performs virtually all of the flight data processing for its entire geographical area of responsibility. Every tower (ATCT) and terminal radar approach control (TRACON) relies exclusively on its parent HCS for flight data.

The HCS also runs algorithms that perform aircraft to aircraft (conflict alert) and aircraft to terrain (Minimum Safe Altitude Warning) separation assurance. The HCS algorithms provide visual and audible alerting to the controller when conflicts are identified.

The HCS presently supplies real time surveillance, flight data and other information to several decision support tools housed in collocated outboard processors connected via two-way high bandwidth links to the HCS and DSR. These are the (User Request Evaluation Tool, (URET), and the Traffic Management Advisory (TMA. URET performs probing of tentative flight plan changes to determine their viability. TMA provides sequencing and spacing information to align the aircraft in En Route airspace for approach.

Integrated Communications Switching System Type I (key system)

The Integrated Communications Switching System Type I (ICSS I) are installed at Airport Traffic Control Towers (ATCT), Terminal Radar Approach Control (TRACON) facilities, and Automated Flight Service Stations (AFSS).

The ICSS I (installed in the ATCT) provides the air traffic control (ATC) operational ground-ground voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/air traffic control system command center (ATCSCC) specialists. Ground-air radio connectivity between ATCT controllers and pilots is also supported by the ICSS I.

The ICSS I (installed in the TRACON) provides the ATC operational ground-ground voice communications interconnectivity between controllers within TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Ground-air radio connectivity between TRACON controllers and pilots is also supported by the ICSS I.

The ICSS I (installed in the AFSS) provides the ATC operational ground-ground voice communications interconnectivity between specialists within an AFSS (intercom), interconnectivity between specialists in separate AFSSs (interphone), and interconnectivity between Flight Service Station (FSS) specialists and Air Route Traffic Control Center (ARTCC) controllers/TRACON controllers/ATCT controllers/Air Traffic Control System Command Center (ATCSCC) specialists. Ground-air radio connectivity between AFSS specialists and pilots is also supported by the ICSS I.

Integrated Communications Switching System Type II (key system)

The Integrated Communications Switching System Type II (ICSS II) are installed at Airport Traffic Control Towers (ATCT), Automated Flight Service Stations(AFSS), and Terminal Radar Approach Control (TRACON) facilities.

The ICSS II (installed in the ATCT) provides the air traffic control (ATC) operational ground-ground voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Ground-air radio connectivity between ATCT controllers and pilots is also supported by the ICSS II.

The ICSS II (installed in the TRACON) provides the ATC operational ground-ground voice communications interconnectivity between controllers within TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC)) controllers/ Flight Service Station (FSS) specialists/air traffic control system command center (ATCSCC) specialists. Ground-air radio connectivity between TRACON controllers and pilots is also supported by the ICSS II.

Leased Inter-facility National Airspace System Communication System

The Leased Inter-facility National Airspace System Communication System (LINCS) provides transmission channels of various industry-standard types between any specified end points, used to satisfy all FAA operational and some administrative telecommunication requirements.

Low-Density Radio Communications Link (key system)

The Low-Density Radio Communications Link (LDRCL) is an FAA owned Low-Density Radio Communications Link (LDRCL) satisfies short-haul, low-density communication requirements. It provides user access (via tail circuits) to a Radio

Communications Link (RCL) site or connectivity between two operational facilities

Microprocessor-En Route Automated Radar Tracking System (key system)

The Microprocessor-En Route Automated Radar Tracking System (Micro-EARTS) is a radar processing system implemented with Commercial Off-the-Shelf (COTS) equipment, for use in both En Route and Terminal environments. It provides single sensor and a mosaic display of traffic and weather using long- and short-range radars. At Anchorage, Alaska, Micro-EARTS also provides Automatic Dependent Surveillance-Broadcast (ADS-B) surveillance and display. Micro-EARTS interfaces with multiple types of displays, including Display System Replacement (DSR), Digital Bright Radar Indicator Tower Equipment (DBRITE), and the flat panel tower controller displays.

Mode 3/AC Transponder (key system)

A Mode 3/AC Transponder (Mode 3/AC XPNDR) is a device that responds to an Air Traffic Control Radar Beacon System (ATCRBS) or Mode S interrogation by transmitting a 12-bit code that identifies an aircraft. Mode 3 is the military identity mode. Mode A is the civil identity mode. Mode 3 and Mode A are reported in identical formats and are called Mode 3/A. The Mode 3/A code in the field consists of 12-bits divided into four groups (A, B, C, and D) of three bits each. The Mode 3/A identity code consists of only four digits, each digit being the octal representation of one of the four groups in the field and listed in the order ABCD. A Mode C transponder is a device that responds to a Air Traffic Control Radar Beacon System (ATCRBS) or a Mode Select (Mode S) interrogation by transmitting an altitude gray code from the aircraft blind altitude encoder.

Mode Select (key system)

The Mode Select (Mode S) mechanism is a ground-based system capable of selective interrogation of Mode S transponders and general interrogation of Air Traffic Control Radar Beacon System (ATCRBS) transponders within range. The system also receives, processes, and forwards the transponder replies to appropriate air traffic control (ATC) automation systems. Data formats for both interrogation and reply include data exchange capability.

The system also provides a Traffic Information Services (TIS) function that makes local traffic data available to the flight deck via the Mode S data link. TIS, a Mode S data link service, provides automatic traffic advisories to properly equipped aircraft. Pilots are able to request and receive a display of nearby traffic. The relative range, bearing, and altitude (if known) and a "proximate" or "threat" classification of nearby aircraft will be displayed in the cockpit.

Mode Select Transponder (key system)

The Mode Select Transponder (Mode S Transponder) is an avionics system that responds to 1,030 MHz interrogations from ground-based sensors or Traffic Alert and Collision Avoidance System (TCAS) airborne avionics with 1,090 MHz replies containing aircraft identification, altitude, and other selected data. Mode S transponders offer improvements over conventional Air Traffic Control Radar Beacon System (ATCRBS) transponders in that they provide over 16 million unique beacon codes, can be selectively interrogated to prevent overlapping or garbling of replies from proximate aircraft, and can provide a high-capacity air-ground data link. In addition to responding to "all call" or "roll call" interrogations from ground-based sensors or TCAS avionics, the Mode S transponders are required to transmit or squitter their 24-bit unique identity and altitude once per second. These squitters are "voluntary" or automatic and not in response to any interrogation. The squitters allow TCAS avionics in proximate aircraft or other systems to acquire Mode S equipped aircraft by only listening on 1,090 MHz.

Multi-Mode Digital Radios (key system)

Multi-Mode Digital Radios (MDRs) are ground-based Very High Frequency (VHF) air-traffic-control radios that can operate in several configurations: 1) analog voice with 25kHz channel spacing; 2) analog voice with 8.33 kHz channel spacing; and 3) VHF Data Link (VDL) Mode-3 which consists of two-way digital voice and data communication.

Peripheral Adapter Module Replacement Item (key system)

The Peripheral Adapter Module Replacement Item (PAMRI) is an interface peripheral to the HOCSR. It provides a conduit through which the HOCSR receives and exchanges data, primarily radar data, flight data and interfacility data. The PAMRI converts communication protocols and translates data formats so the Host and EDARC can communicate with external devices.

Power System - Long-Range Radar (key system)

The Power System - Long-Range Radar (Pwr Sys - LRR) mechanism provides conditioning of commercial power, including uninterruptible power systems (UPS), to eliminate voltage dropouts, surges, and voltage sags caused by sources outside the facility. Power distribution, grounding, bonding and shielding of electrical system within the facility is also part of the Pwr Sys - LRR.

Radar Automated Display System (key system)

The Radar Automated Display System (RADS) is the Air Traffic Controller workstation for the Automated Radar Terminal System Model IIE (ARTS IIE).

Radio Communication Link (key system)

Radio Communication Link (RCL) is an integrated voice and data microwave transmission system designed to provide the FAA with cost effective and reliable service for its high capacity NAS communications routes. RCL interconnects air route traffic control center (ARTCC) facilities with long range radar installations and other air traffic control (ATC) facilities.

Radio Control Equipment (key system)

Radio Control Equipment (RCE), located at both ATC facilities and remote communication sites, control the operation of remotely located ground to air Very High Frequency/Ultra High Frequency (VHF/UHF) radios used by air traffic controllers to communicate with pilots. RCE interfaces with the voice switch at the ATC facility, telephone landlines, and ground to air radios at the En Route Remote Communications Air/Ground (RCAG) sites, Terminal Remote Transmitter/Receiver (RTR) sites, and Flight Service Station Remote Communications Outlet (RCO) sites.

Rapid Deployment Voice Switch Type I (key system)

The Rapid Deployment Voice Switch Type I (RDVS I) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS I (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the RDVS I.

The RDVS I (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the RDVS I.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS I systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Rapid Deployment Voice Switch Type II (key system)

The Rapid Deployment Voice Switch Type II (RDVS II) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS II (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the RDVS II. The RDVS II (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the RDVS II.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS II systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Rapid Deployment Voice Switch Type IIA (key system)

The Rapid Deployment Voice Switch Type IIA (RDVS IIA) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS IIA (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. The RDVS IIA also supports air-to-ground (A/G) radio connectivity between ATCT controllers and pilots. The RDVS IIA (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between TRACON controllers and pilots is also supported by the RDVS IIA.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS IIA systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Remote Automated Radar Terminal System (ARTS) Color Display (key system)

Remote Automated Radar Terminal System Color Display (R-ACD) Description The Remote - Automated Radar Terminal System (ARTS) Color Display (ACD) is a high performance, full function, and color display providing air traffic controllers with the functionality of the Digital Bright Radar Indicator Tower Equipment (DBRITE). This display supports keyboard and trackball functions for the ARTS II, ARTS IIE, and ARTS IIIE. A radar gateway function will be incorporated to provide a primary and secondary radar data path to the R-ACD in the event of failure of both the ARTS II and ARTS IIIA processing systems.

Satellite Communication Airborne Radios

The Satellite Communication (SATCOM) airborne radios are transceivers installed in commercial, cargo, and military aircraft transiting in the National Airspace System (NAS) and are used as an alternate means of voice communications between pilots in aircraft and ground controllers. These transceivers are typically used in transoceanic applications.

Satellite Communication Ground Radios

Satellite Communications (SATCOM) Ground Radios are transceivers installed at oceanic and en route facilities to support an alternative means of tactical air traffic control (ATC) voice communications between ground controllers and pilots in aircraft. These transceivers are typically used in transoceanic applications. These transceivers are also installed at regional facilities and used as an alternate means of communications in case of total ground communications failure or between locations in mountainous terrain or where other means of communications are not possible (e.g., Alaska).

Oceanic air to ground satellite communications are provided via a communications service provider. The FAA currently has no plans to develop or implement its own air to ground SATCOM ground radios.

Small Tower Voice Switch (key system)

The Small Tower Voice Switch (STVS) is installed in small Airport Traffic Control Towers (ATCT) and in Flight Service Stations (FSS). The basic STVS has four operator positions. The STVS provides the Air Traffic Control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and Air Route Traffic Control Center (ARTCC) controllers/ Terminal Radar Approach Control (TRACON) controllers/FSS specialists/air traffic control system command center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the STVS. The STVS (installed in the FSS) provides the ATC operational

G/G voice communications interconnectivity between specialists within an FSS (intercom), interconnectivity between specialists in separate FSSs (interphone), and interconnectivity between FSS specialists and Air Route Traffic Control Center (ARTCC) controllers/Terminal Radar Approach Control (TRACON) controllers/ATCT controllers/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground radio connectivity between FSS specialists and pilots is also supported by the STVS.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate STVS systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Standard Terminal Automation Replacement System Early Display Configuration

The Standard Terminal Automation Replacement System, Early Display Configuration (STARS EDC) provides STARS workstations at a limited number of ARTS IIIA facilities to replace aging DEDS and provide validation of the STARS workstation design before the complete STARS is implemented. STARS EDC will include updates to ARTS software for life cycle maintenance, additional human-machine interface (HMI) requirements for both tower and Terminal Radar Approach Control (TRACON), and Automated Radar Terminal System Model IIIE (ARTS IIIE) human factors validation.

Standard Terminal Automation Replacement System Tower Display Workstation

The Standard Terminal Automation Replacement System Tower Display Workstation (STARS TDW) provides the interface between the ATC Towerl (ATCT) controller and the STARS processing unit.

Surveillance Processor (Safe Flight 21)

The Surveillance Processor (Safe Flight 21) is a demonstration system that receives, processes, and distributes surveillance data between Safe Flight 21 (SF-21) architectural elements to support operational trials. The processor receives surveillance data from various sources, including surveillance sensors, Automatic Dependent Surveillance-Broadcast (ADS-B) systems, multilateration systems, Air Traffic Control (ATC) automation systems, and flight plan processing systems. The processor fuses the various surveillance data to create aircraft track data, which is distributed to various SF-21 architectural elements. One of the capabilities supported by the processor is the processing and distribution of Traffic Information Services - Broadcast (TIS-B) information to ADS (SF-21) Ground Stations, for subsequent transmission to aircraft.

Ultra High Frequency Airborne Radios (key system)

The Ultra High Frequency Avionics (UHF Avionics) are analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225-400 MHz frequency band, which are multi-channel transceivers, installed in an airborne military platform. These airborne devices support the tactical two-way voice communications/ coordination between the military pilot in the military aircraft and the controller on the ground.

Ultra High Frequency Ground Radios (key system)

Ultra High Frequency (UHF) Ground Radios are analog UHF amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 Mhz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and flight service station domains.

Ultra High Frequency Ground Radios - Replacement (key system)

The Ultra High Frequency Ground Radios - Replacement (UHF Ground Radios - Repl) mechanism represents analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 MHz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and Flight Service Station domains.

Very High Frequency Airborne Radios (key system)

Very High Frequency (VHF) Airborne Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 Mhz frequency band which are multi-channel transceivers installed in an airborne platform (e.g., commercial, cargo, and general aviation aircraft). These airborne devices support the tactical two-way voice communications/coordination between the pilot in the aircraft and the controller on the ground.

Very High Frequency Ground Radios (key system)

Very High Frequency (VHF) Ground Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 MHz frequency band which are single-channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the pilot in commercial, cargo, or general aviation aircraft in the oceanic, en route (i.e., ARTCC), terminal (i.e., TRACON/tower), and flight service station domains. Additionally, there are analog VHF frequency modulation (VHF - FM) radio devices operating in the 161 - 174 MHz frequency band that are multi-channel transceivers. These transceivers are used by flight inspection, aviation security, and airway facility specialists supporting local airport operations and maintenance or to perform their operational maintenance mission in support of the NAS. However, these same VHF-FM transceivers are also used to support the resolution of emergency situations or establish a level of voice command and control communications/coordination during disaster recovery.

Very High Frequency Mobile Radios (key system)

Very High Frequency (VHF) Mobile Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 Mhz frequency band which are multi-channel transceivers installed in surface vehicles (e.g., "follow-me," maintenance, administrative, and snow-removal vehicles). These devices support the tactical two-way voice communications/coordination between the operators in the vehicles and the tower controllers or airline operations personnel.

Very High Frequency Multi-Mode Airborne Radios (key system)

Very High Frequency Multi-Mode Airborne Radios (VHF MM Airborne Radios) refers to an airborne radio operating in the very high frequency (VHF) range capable of operating in the following modes: (1)) analog voice (i.e., 25 kHz spacing for use in the United States and other similarly equipped countries); (2) VHF Digital Link Mode 2 (VDL Mode-2) (two-way digital data transmission); (3) VHF Digital Link Mode 3 (VDL Mode-3), (integrated two-way digital voice/data transmission); and (4) analog voice (i.e., 8.33 kHz spacing for use in Europe and other similarly equipped countries).

Voice Switching and Control System (key system)

The Voice Switching and Control System (VSCS) is installed in the Air Route Traffic Control Center (ARTCC). The VSCS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The VSCS provides the Air Traffic Control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ARTCC (intercom), interconnectivity between controllers in separate ARTCCs (interphone), and interconnectivity between ARTCC controllers and Terminal Radar Approach Control (TRACON) controllers/Airport Traffic Control Tower (ATCT) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ARTCC controllers and pilots is also supported by the VSCS.

Voice Switching and Control System Modification (Technological Refresh) (key system)

The Tech Refresh for VSCS is a service life extension. The Tech Refresh encompasses workstation upgrade, video display monitor, control equipment power, VSCU supportability, control shelf power supply, and software development demonstration system expansion.

Voice Switching and Control System Training and Backup Switches

Voice Switching and Control System Training and Backup Switch (VTABS) was developed to meet AT requirements for a separate standalone VSCS Backup and Training System. VTABS can be configured as a 50-position switch with the capability to support air traffic operations in the event of VSCS failure, hardware and software maintenance or power loss.

Western Electric Company Model 301 Voice Switch

The Western Electric Company Model 301 Voice Switch (WECO 301) supports air-to-ground communications between air traffic controllers and pilots and ground-to-ground communications among air traffic control (ATC) personnel.

People

Ground Controller

A Ground Controller performs the following activities: Ensure separation; Control vehicles as well as aircraft on movement areas other than active runways Initiate control instructions; Monitor and operate communications equipment; Utilize tower radar display(s); Utilize alphanumerics; Assist the tower associate controller with coordination; Scan tower cab environment; Ensure computer entries and strip marking are completed for instructions or clearances issued or received; Process and forward flight plan information; Perform any functions of the tower team which will assist in meeting situation objectives; Coordinate with local control for safe and efficient use of runways and movement areas.

Local Controller

A Local Controller performs the following activities: Ensure separation; Control active runways; Initiate control instructions; Monitor and operate communications equipment; Utilize tower radar display(s); Utilize alphanumerics; Assist the tower associate controller with coordination; Scan tower cab environment; Ensure computer entries and strip marking are completed for instructions or clearances issued or received; Process and forward flight plan information; Perform any functions of the tower team which will assist in meeting situation objectives; Coordinate with ground control for safe and efficient use of runways and movement areas.

Non-Radar Controller

A Non-Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate transfer of control, communications, and flight data; Ensure computer entries are completed on instructions or clearances issued or received; Ensure strip marking is completed on instructions or clearances issued or received.

Radar Controller

A Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate automated handoffs; Assist the radar associate controller with non-automated handoff actions when needed; Assist the radar associate controller in coordination when needed; Scan radar display; Correlate with flight progress strip information; Ensure computer entries are completed on instructions or clearances you issue or receive; Ensure strip marking is completed on instructions or clearances you issue or receive.

Interfaces

Air Route Surveillance Radar - Model 1E — (Surveillance Data) ➔ Air Traffic Control Beacon Interrogator - Model 6

The ATCBI-6 correlates return signals from the primary radar with beacon signals and transmits the data to the automation system.

Air Route Surveillance Radar - Model 1E — (Surveillance Data) ➔ Mode Select

The MODE S system correlates the primary radar returns with beacon data and transmits them to the automation system for tracking and display.

Air Route Surveillance Radar - Model 1E — (Surveillance Data) ➔ Peripheral Adapter Module Replacement Item

The ARSR-1 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the PAMRI interface, which then routes the data to the HCS and DARC for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 1E — (Weather Data) ➔ Peripheral Adapter Module Replacement Item

The ARSR-1E long-range radar provides detected weather data to the PAMRI for processing at en route facilities.

Air Route Surveillance Radar - Model 2 — (Surveillance Data) ➔ Air Traffic Control Beacon Interrogator - Model 6

The ATCBI-6 correlates return signals from the primary radar with beacon signals and transmits the data to the automation system.

Air Route Surveillance Radar - Model 2 — (Surveillance Data) ➔ Mode Select

The MODE S system correlates the primary radar returns with beacon data and transmits them to the automation system for tracking and display.

Air Route Surveillance Radar - Model 2 — (Surveillance Data) ➔ Peripheral Adapter Module Replacement Item

The ARSR-2 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the PAMRI interface, which then routes the data to the HCS and DARC for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 2 — (Weather Data) ➔ Peripheral Adapter Module Replacement Item

The ARSR-2 long-range radar provides detected weather data to the PAMRI for processing at en route facilities.

Air Route Surveillance Radar - Model 3 — (Surveillance Data) ➔ Air Traffic Control Beacon Interrogator - Model 6

The ATCBI-6 correlates return signals from the primary radar with the beacon signals and transmits the data to the automation system for tracking and display.

Air Route Surveillance Radar - Model 3 — (Surveillance Data) ➔ Microprocessor-En Route Automated Radar Tracking System

The ARSR-3 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the Micro-EARTS for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 3 — (Surveillance Data) ➔ Peripheral Adapter Module Replacement Item

The ARSR-3 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the PAMRI interface, which then routes the data to the HCS and DARC for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 3 — (Weather Data) ➔ Peripheral Adapter Module Replacement Item

The ARSR-3 long-range radar provides detected weather data to the PAMRI for processing at en route facilities.

Air Route Surveillance Radar - Model 4 — (Surveillance Data) ➔ Air Traffic Control Beacon Interrogator - Model 6

The ATCBI-6 correlates return signals from the primary radar with the beacon signals and transmits the data to the automation system for tracking and display.

Air Route Surveillance Radar - Model 4 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIE

The ARSR-4 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.

Air Route Surveillance Radar - Model 4 — (Weather Data) ➔ Automated Radar Terminal System - Model IIE

The ARSR-4 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIE for processing and use in controlling air traffic in the CERAP domain (Guam).

Air Route Surveillance Radar - Model 4 — (Surveillance Data) ➔ Microprocessor-En Route Automated Radar Tracking System

The ARSR-4 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the Micro-EARTS for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 4 — (Weather Data) ➔ Microprocessor-En Route Automated Radar Tracking System

The ARSR-4 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the Micro-EARTS for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 4 — (Surveillance Data) ➔ Peripheral Adapter Module Replacement Item

The ARSR-4 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the PAMRI interface, which then routes the data to the HCS and DARC for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 4 — (Weather Data) ➔ Peripheral Adapter Module Replacement Item

The ARSR-4 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the PAMRI for processing and use in controlling air traffic in the en route domain.

Air Traffic Control Beacon Interrogator - Model 4 — (Surveillance Data) ➔ Air Route Surveillance Radar - Model 1E

The ARSR-1 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports via a CD-2, which sends the data to an automation system for tracking and display.

Air Traffic Control Beacon Interrogator - Model 4 — (Surveillance Data) ➔ Air Route Surveillance Radar - Model 2

The ARSR-2 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports via a CD-2, which sends the data to an automation system for tracking and display.

Air Traffic Control Beacon Interrogator - Model 4 — (Surveillance Data) ➔ Airport Surveillance Radar - Model 9

The ASR-9 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports and then sends the data to an automation system for tracking and display.

Air Traffic Control Beacon Interrogator - Model 4 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIE

The ATCBI-4 sends aircraft identification, position, and altitude to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.

Air Traffic Control Beacon Interrogator - Model 4 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIE

The ATCBI-4 sends aircraft identification, position, and altitude to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.

Air Traffic Control Beacon Interrogator - Model 4 — (Surveillance Data) ➔ Microprocessor-En Route Automated Radar Tracking System

The ATCBI-4 sends aircraft identification, position, and altitude to the Micro-EARTS for processing and use in controlling air traffic in the terminal domain from a CERAP.

Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) ➔ Air Route Surveillance Radar - Model 1E

The ARSR-1 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports via a CD-2, which sends the data to an automation system for tracking and display.

Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) ➔ Air Route Surveillance Radar - Model 2

The ARSR-2 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports via a CD-2, which sends the data to an automation system for tracking and display.

Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) ➔ Air Route Surveillance Radar - Model 3

The ARSR-3 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports and then sends the data to an automation system for tracking and display.

Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) ➔ Air Route Surveillance Radar - Model 4

The ARSR-4 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports and then sends the data to an automation system for tracking and display.

Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) ➔ Airport Surveillance Radar - Model 9

The ASR-9 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports and then sends the data to an automation system for tracking and display.

Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIE

The ATCBI-5 sends aircraft identification, position, and altitude to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.

Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIA

The ATCBI-5 sends aircraft identification, position, and altitude to the ARTS IIIA for processing and use in controlling air traffic in the terminal domain.

Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIE

The ATCBI-5 sends aircraft identification, position, and altitude to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.

Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) ➔ Microprocessor-En Route Automated Radar Tracking System

The ATCBI-4 sends aircraft identification, position, and altitude to the Micro-EARTS for processing and use in controlling air traffic in the en route domain, as well as in terminal domains associated with CERAPs.

Air Traffic Control Beacon Interrogator - Model 6 — (Surveillance Data) ➔ Peripheral Adapter Module Replacement Item
The ATCBI-6 sends aircraft identification, position, and altitude to the PAMRI, which then routes to the HCS or DARC for processing and use in controlling air traffic in the en route domain.
Airport Surface Detection Equipment - Model 3 — (Surveillance Data) ➔ Airport Movement Area Safety System
The AMASS tracks the movement of aircraft and ground vehicles detected by the ASDE-3 surface radar and provides visual and aural alerts of potential runway incursions and unsafe conditions.
Airport Surveillance Radar - Model 11 — (Surveillance Data) ➔ Airport Movement Area Safety System
The AMASS system receives and processes the position, direction and speed of arriving aircraft from the airport surveillance radar to identify potential runway incursions and other unsafe conditions.
Airport Surveillance Radar - Model 11 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIE
The ASR-11 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 11 — (Weather Data) ➔ Automated Radar Terminal System - Model IIE
The ASR terminal radar provides detected weather data to the ARTS for processing.
Airport Surveillance Radar - Model 11 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIE
The ASR-11 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 11 — (Weather Data) ➔ Automated Radar Terminal System - Model IIIE
The ASR primary radar provides detected weather data to the ARTS for processing.
Airport Surveillance Radar - Model 11 — (Surveillance Data) ➔ Microprocessor-En Route Automated Radar Tracking System
The ASR-11 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the automation equipment interface, which then routes the data to the Micro EARTS for processing and use in controlling air traffic in the en route domain.
Airport Surveillance Radar - Model 7 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIE
The ASR-7 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 7 — (Weather Data) ➔ Automated Radar Terminal System - Model IIE
The ASR-7 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 7 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIE
The ASR-7 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 7 — (Weather Data) ➔ Automated Radar Terminal System - Model IIIE
The ASR-7 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 7 — (Surveillance Data) ➔ Microprocessor-En Route Automated Radar Tracking System
The ASR-7 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the Micro-EARTS for processing and use in controlling air traffic in the terminal domain from a CERAP.
Airport Surveillance Radar - Model 7 — (Surveillance Data) ➔ Mode Select
The MODE S system correlates the primary radar returns with beacon data and transmits them to the automation system for tracking and display.
Airport Surveillance Radar - Model 8 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIE
The ASR-8 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 8 — (Weather Data) ➔ Automated Radar Terminal System - Model IIE
The ASR-8 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIE use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 8 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIA
The ASR-8 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIA for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 8 — (Weather Data) ➔ Automated Radar Terminal System - Model IIIA
The ASR-8 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIIA for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 8 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIE
The ASR-8 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 8 — (Weather Data) ➔ Automated Radar Terminal System - Model IIIE
The ASR-8 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 8 — (Surveillance Data) ➔ Microprocessor-En Route Automated Radar Tracking System
The ASR-8 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the Micro-EARTS for processing and use in controlling air traffic in the terminal domain from a CERAP.
Airport Surveillance Radar - Model 8 — (Surveillance Data) ➔ Mode Select
The MODE S system correlates the primary radar returns with beacon data via a Beacon Video Reconstitutor (BVR) and transmits them to the automation system for tracking and display.
Airport Surveillance Radar - Model 8 — (Surveillance Data) ➔ Peripheral Adapter Module Replacement Item
The ASR-8 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the PAMRI for processing and use in controlling air traffic in the terminal domain from an ARTCC (for terminals with no TRACON).
Airport Surveillance Radar - Model 9 — (Surveillance Data) ➔ Airport Movement Area Safety System
The AMASS system receives and processes the position, direction and speed of arriving aircraft from the airport surveillance radar to identify potential runway incursions and other unsafe conditions.
Airport Surveillance Radar - Model 9 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIE
The ASR-9 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 9 — (Weather Data) ➔ Automated Radar Terminal System - Model IIE
The ASR terminal radar provides detected weather data to the ARTS for processing.
Airport Surveillance Radar - Model 9 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIA
The ASR-9 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIA for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 9 — (Weather Data) ➔ Automated Radar Terminal System - Model IIIA
The ASR terminal radar provides detected weather data to the ARTS for processing.
Airport Surveillance Radar - Model 9 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIE
The ASR-9 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 9 — (Weather Data) ➔ Automated Radar Terminal System - Model IIIE
The ASR primary radar provides detected weather data to the ARTS for processing.
Airport Surveillance Radar, Military — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIE
The GPN-20 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar, Military — (Weather Data) ➔ Automated Radar Terminal System - Model IIE
The GPN-20 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIE use in controlling air traffic in the terminal domain.
Airport Surveillance Radar, Military — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIA
The GPN-20 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIA for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar, Military — (Weather Data) ➔ Automated Radar Terminal System - Model IIIA
The GPN-20 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIIA use in controlling air traffic in the terminal domain.
Airport Surveillance Radar, Military — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIE
The GPN-20 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar, Military — (Weather Data) ➔ Automated Radar Terminal System - Model IIIE
The GPN-20 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIIE use in controlling air traffic in the terminal domain.
Airport Surveillance Radar, Military — (Surveillance Data) ➔ Peripheral Adapter Module Replacement Item
The GPN-20 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the PAMRI for processing and use in controlling air traffic in the terminal domain from an ARTCC (for terminals with no TRACON).
Automated Radar Terminal System - Model IIE — (Flight Data) ➔ Airport Movement Area Safety System
AMASS receives aircraft tag data from the Automated Radar Tracking System (ARTS) via the Terminal Automation Interface Unit (TAIU). AMASS then evaluates the data along with surveillance data received from airport surveillance radar to generate visual and aural alerts of potential runway incursions and other unsafe conditions.
Automated Radar Terminal System - Model IIE — (Flight Data) ➔ Automated Radar Terminal System Color Display
The ACD displays ARTS flight data to the controller.
Automated Radar Terminal System - Model IIE — (Track Data) ➔ Automated Radar Terminal System Color Display
The ARTS sends track data to the ACD for controller use.
Automated Radar Terminal System - Model IIE ← (Track Data) ➔ Peripheral Adapter Module Replacement Item
The ARTS IIE provides terminal surveillance data to ARTCC's via PAMRI.
Automated Radar Terminal System - Model IIE — (Track Data) ➔ Radar Automated Display System
The ARTS associates surveillance data from the ASR with flight data and provides track data to the controller workstation RADS for display.
Automated Radar Terminal System - Model IIIA — (Flight Data) ➔ Airport Movement Area Safety System
AMASS receives aircraft tag data from the Automated Radar Tracking System (ARTS) via the Terminal Automation Interface Unit (TAIU). AMASS then evaluates the data along with surveillance data received from airport surveillance radar to generate visual and aural alerts of potential runway incursions and other unsafe conditions.
Automated Radar Terminal System - Model IIIA — (Flight Data) ➔ Automated Radar Terminal System Color Display
The ACD displays ARTS flight data to the controller.
Automated Radar Terminal System - Model IIIA — (Track Data) ➔ Automated Radar Terminal System Color Display
The ARTS sends track data to the ACD for controller use.
Automated Radar Terminal System - Model IIIA — (Track Data) ➔ Full Digital Automated Radar Terminal System Display
Track data are exchanged between ARTS IIIA and the controller using FDAD.
Automated Radar Terminal System - Model IIIA — (Flight Data) ➔ Host Computer System
The ARTS IIIA provides flight data to HCS via PAMRI.
Automated Radar Terminal System - Model IIIA — (Track Data) ➔ Host Computer System
The ARTS IIIA provides surveillance data to HCS via PAMRI.
Automated Radar Terminal System - Model IIIA ← (Track Data) ➔ Peripheral Adapter Module Replacement Item
The ARTS IIIA provides surveillance data to ARTCC's via PAMRI.
Automated Radar Terminal System - Model IIIE — (Flight Data) ➔ Airport Movement Area Safety System
AMASS receives aircraft tag data from the Automated Radar Tracking System (ARTS) via the Terminal Automation Interface Unit (TAIU). AMASS then evaluates the data along with surveillance data received from airport surveillance radar to generate visual and aural alerts of potential runway incursions and other unsafe conditions.
Automated Radar Terminal System - Model IIIE — (Flight Data) ➔ Automated Radar Terminal System Color Display
The ACD displays ARTS flight data to the controller.
Automated Radar Terminal System - Model IIIE — (Track Data) ➔ Automated Radar Terminal System Color Display
The ARTS sends track data to the ACD for controller use.
Automated Radar Terminal System - Model IIIE — (Track Data) ➔ Full Digital Automated Radar Terminal System Display
Track data are exchanged between ARTS IIIE and the controller using FDAD.
Automated Radar Terminal System - Model IIIE — (Flight Data) ➔ Host Computer System
The ARTS IIIE provides flight data to HCS via PAMRI.
Automated Radar Terminal System - Model IIIE — (Track Data) ➔ Host Computer System

The ARTS IIIE provides surveillance data to HCS via PAMRI.

Automated Radar Terminal System - Model IIIE ← (Track Data) → Peripheral Adapter Module Replacement Item

The ARTS IIIE provides surveillance data to ARTCC's via PAMRI.

Enhanced Terminal Voice Switch — (Voice Communication) → Digital Voice Recorder System

This interface records and temporarily archives voice transmissions.

Enhanced Terminal Voice Switch ← (Voice Communication) → Enhanced Terminal Voice Switch

This interface enables ATC voice communication between controllers in same or different facilities.

Enhanced Terminal Voice Switch ← (Voice Communication) → Integrated Communications Switching System Type I

This interface enables ATC voice communication between controllers in different facilities.

Enhanced Terminal Voice Switch ← (Voice Communication) → Integrated Communications Switching System Type II

This interface enables ATC voice communication between controllers in different facilities.

Enhanced Terminal Voice Switch ← (Voice Communication) → Multi-Mode Digital Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Enhanced Terminal Voice Switch ← (Voice Communication) → Rapid Deployment Voice Switch Type I

This interface enables ATC voice communication between controllers in different facilities.

Enhanced Terminal Voice Switch ← (Voice Communication) → Rapid Deployment Voice Switch Type II

This interface enables ATC voice communication between controllers in different facilities.

Enhanced Terminal Voice Switch ← (Voice Communication) → Rapid Deployment Voice Switch Type IIA

This interface enables ATC voice communication between controllers in different facilities.

Enhanced Terminal Voice Switch ← (Voice Communication) → Small Tower Voice Switch

This interface enables ATC voice communication between controllers in different facilities.

Enhanced Terminal Voice Switch ← (Voice Communication) → Ultra High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Enhanced Terminal Voice Switch ← (Voice Communication) → Ultra High Frequency Ground Radios - Replacement

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Enhanced Terminal Voice Switch ← (Voice Communication) → Very High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Enhanced Terminal Voice Switch ← (Voice Communication) → Voice Switching and Control System

This interface enables ATC voice communication between controllers in different facilities.

Enhanced Terminal Voice Switch ← (Voice Communication) → Voice Switching and Control System Modification (Technological Refresh)

This interface enables ATC voice communication between controllers in different facilities.

Host Computer System ← (Flight Data) → Display System Replacement

The HCS sends flight data, time data, traffic management advisories to the DSR display and sends flight plans to the Flight Strip Printer. HCS receives flight plan amendments from ATC via entries on the R-position DSR.

Host Computer System ← (Track Data) → Display System Replacement

The HCS sends target fixes and track data to DSR and receives re-assignment of surveillance to sectors from ATCs as needed. (Note: the type of data passed to DSR is not raw surveillance data but rather is Target (fixes) and track (series of fixes) data produced by the HCS RDP.

Host Computer System — (Weather Data) → Display System Replacement

The HCS sends alphanumeric weather data to the DSR. Note: This is different from weather graphics, which is displayed on the DSR D-position from WARP.

Integrated Communications Switching System Type I — (Voice Communication) → Digital Voice Recorder System

This interface records and temporarily archives voice transmissions.

Integrated Communications Switching System Type I ← (Voice Communication) → Integrated Communications Switching System Type I

This interface enables ATC voice communication between controllers in same or different facilities.

Integrated Communications Switching System Type I ← (Voice Communication) → Integrated Communications Switching System Type II

This interface enables ATC voice communication between controllers in different facilities.

Integrated Communications Switching System Type I ← (Voice Communication) → Multi-Mode Digital Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Integrated Communications Switching System Type I ← (Voice Communication) → Rapid Deployment Voice Switch Type I

This interface enables ATC voice communication between controllers in different facilities.

Integrated Communications Switching System Type I ← (Voice Communication) → Rapid Deployment Voice Switch Type II

This interface enables ATC voice communication between controllers in different facilities.

Integrated Communications Switching System Type I ← (Voice Communication) → Rapid Deployment Voice Switch Type IIA

This interface enables ATC voice communication between controllers in different facilities.

Integrated Communications Switching System Type I ← (Voice Communication) → Small Tower Voice Switch

This interface enables ATC voice communication between controllers in different facilities.

Integrated Communications Switching System Type I ← (Voice Communication) → Ultra High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Integrated Communications Switching System Type I ← (Voice Communication) → Ultra High Frequency Ground Radios - Replacement

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Integrated Communications Switching System Type I ← (Voice Communication) → Very High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Integrated Communications Switching System Type I ← (Voice Communication) → Voice Switching and Control System

This interface enables ATC voice communication between controllers in different facilities.

Integrated Communications Switching System Type I ← (Voice Communication) → Voice Switching and Control System Modification (Technological Refresh)

This interface enables ATC voice communication between controllers in different facilities.

Integrated Communications Switching System Type II — (Voice Communication) → Digital Voice Recorder System

This interface records and temporarily archives voice transmissions.

Integrated Communications Switching System Type II ← (Voice Communication) → Integrated Communications Switching

System Type II
This interface enables ATC voice communication between controllers in same or different facilities.
Integrated Communications Switching System Type II ⇐ (Voice Communication) ⇒ Multi-Mode Digital Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Integrated Communications Switching System Type II ⇐ (Voice Communication) ⇒ Rapid Deployment Voice Switch Type I
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type II ⇐ (Voice Communication) ⇒ Rapid Deployment Voice Switch Type II
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type II ⇐ (Voice Communication) ⇒ Rapid Deployment Voice Switch Type IIA
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type II ⇐ (Voice Communication) ⇒ Small Tower Voice Switch
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type II ⇐ (Voice Communication) ⇒ Ultra High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Integrated Communications Switching System Type II ⇐ (Voice Communication) ⇒ Ultra High Frequency Ground Radios - Replacement
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Integrated Communications Switching System Type II ⇐ (Voice Communication) ⇒ Very High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Integrated Communications Switching System Type II ⇐ (Voice Communication) ⇒ Voice Switching and Control System
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type II ⇐ (Voice Communication) ⇒ Voice Switching and Control System Modification (Technological Refresh)
This interface enables ATC voice communication between controllers in different facilities.
Mode 3/AC Transponder — (Surveillance Data) ⇒ Air Traffic Control Beacon Interrogator - Model 4
The ATCBI-4 interrogates and receives aircraft identification, position and altitude information from aircraft equipped with Air Traffic Control Radar Beacon System (ATCRBS) transponder.
Mode 3/AC Transponder — (Surveillance Data) ⇒ Air Traffic Control Beacon Interrogator - Model 5
The ATCBI-5 interrogates and receives aircraft identification, position and altitude information from aircraft equipped with Air Traffic Control Radar Beacon System (ATCRBS) transponder.
Mode 3/AC Transponder — (Surveillance Data) ⇒ Air Traffic Control Beacon Interrogator - Model 6
The ATCBI-6 interrogates and receives aircraft identification, position and altitude information from aircraft equipped with Air Traffic Control Radar Beacon System (ATCRBS) transponder.
Mode 3/AC Transponder — (Surveillance Data) ⇒ Airport Surveillance Radar - Model 11
The integrated secondary surveillance radar on the ASR-11 interrogates onboard transponders to acquire identification, postion, and altitude data from the aircraft.
Mode 3/AC Transponder — (Surveillance Data) ⇒ Mode Select
The Mode S interrogates and receives aircraft identification, position and altitude information from aircraft equipped with Air Traffic Control Radar Beacon System (ATCRBS) transponder.
Mode Select — (Surveillance Data) ⇒ Airport Surveillance Radar - Model 9
The ASR-9 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports and then sends the data to an automation system for tracking and display.
Mode Select — (Surveillance Data) ⇒ Automated Radar Terminal System - Model IIE
The Mode S sends aircraft identification, position, and altitude to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.
Mode Select — (Surveillance Data) ⇒ Automated Radar Terminal System - Model IIIA
The Mode S sends aircraft identification, position, and altitude to the ARTS IIIA for processing and use in controlling air traffic in the terminal domain.
Mode Select — (Surveillance Data) ⇒ Automated Radar Terminal System - Model IIIE
The Mode S sends aircraft identification, position, and altitude to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.
Mode Select — (Surveillance Data) ⇒ Peripheral Adapter Module Replacement Item
The Mode S ground station sends aircraft identification, position, and altitude to the PAMRI, which then routes to the HCS or DARC for processing and use in controlling air traffic in the en route domain.
Mode Select Transponder — (Surveillance Data) ⇒ Air Traffic Control Beacon Interrogator - Model 4
The ATCBI-4 interrogates and receives aircraft identification, position and altitude information from aircraft equipped with the Mode S transponder.
Mode Select Transponder — (Surveillance Data) ⇒ Air Traffic Control Beacon Interrogator - Model 5
The ATCBI-5 interrogates and receives aircraft identification, position and altitude information from aircraft equipped with the Mode S transponder.
Mode Select Transponder — (Surveillance Data) ⇒ Air Traffic Control Beacon Interrogator - Model 6
The ATCBI-6 interrogates and receives aircraft identification, position and altitude information from aircraft equipped with the Mode S transponder.
Mode Select Transponder — (Surveillance Data) ⇒ Airport Surveillance Radar - Model 11
The integrated secondary surveillance radar on the ASR-11 interrogates onboard transponders to acquire identification, postion, and altitude data from the aircraft.
Mode Select Transponder — (Surveillance Data) ⇒ Mode Select
The Mode S interrogates and receives aircraft identification, position, altitude, and other information from aircraft equipped with the Mode S Transponder.
Multi-Mode Digital Radios ⇐ (Voice Communication) ⇒ Radio Control Equipment
Multi-Mode Digital Radios ⇐ (Voice Communication) ⇒ Very High Frequency Airborne Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Multi-Mode Digital Radios ⇐ (Voice Communication) ⇒ Very High Frequency Mobile Radios
Voice communication providing ATC coordination and direction between controllers and pilots and between controllers and

ground vehicle operators.

Multi-Mode Digital Radios ← (Voice Communication) → Very High Frequency Multi-Mode Airborne Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Peripheral Adapter Module Replacement Item — (Flight Data) → Host Computer System

The PAMRI is a conduit through which the HCS receives and exchanges flight data with remote FDIO flight strip printer system (printer/display/keyboard) as well as with external automation systems such as ARTS/STARS (TRACON), ODAPS/FDP2000 (Ocean), and FSM (ATCSCC). FDIO uses the General Purpose Input/Output (GPI/O) parallel interfaces and automation systems use the Interfacility Communications Input/Output (INTI/O) serial interfaces.

Peripheral Adapter Module Replacement Item — (Surveillance Data) → Host Computer System

The PAMRI passes surveillance data from the primary/secondary radars to the HCS for processing and use in controlling aircraft.

Peripheral Adapter Module Replacement Item — (Flight Data) → Peripheral Adapter Module Replacement Item

The PAMRI passes flight data between ARTCCs.

Peripheral Adapter Module Replacement Item — (Track Data) → Peripheral Adapter Module Replacement Item

The PAMRI passes track data between ARTCCs.

Radio Control Equipment ← (Voice Communication) → Enhanced Terminal Voice Switch

Radio Control Equipment ← (Voice Communication) → Integrated Communications Switching System Type I

Radio Control Equipment ← (Voice Communication) → Integrated Communications Switching System Type II

Radio Control Equipment ← (Data Communication) → Radio Control Equipment

Radio Control Equipment ← (Voice Communication) → Rapid Deployment Voice Switch Type I

Radio Control Equipment ← (Voice Communication) → Rapid Deployment Voice Switch Type II

Radio Control Equipment ← (Voice Communication) → Rapid Deployment Voice Switch Type IIA

Radio Control Equipment ← (Voice Communication) → Small Tower Voice Switch

Radio Control Equipment ← (Voice Communication) → Voice Switching and Control System

Radio Control Equipment ← (Voice Communication) → Voice Switching and Control System Modification (Technological Refresh)

Rapid Deployment Voice Switch Type I — (Voice Communication) → Digital Voice Recorder System

This interface records and temporarily archives voice transmissions.

Rapid Deployment Voice Switch Type I ← (Voice Communication) → Multi-Mode Digital Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Rapid Deployment Voice Switch Type I ← (Voice Communication) → Rapid Deployment Voice Switch Type I

This interface enables ATC voice communication between controllers in same or different facilities.

Rapid Deployment Voice Switch Type I ← (Voice Communication) → Rapid Deployment Voice Switch Type II

This interface enables ATC voice communication between controllers in different facilities.

Rapid Deployment Voice Switch Type I ← (Voice Communication) → Rapid Deployment Voice Switch Type IIA

This interface enables ATC voice communication between controllers in different facilities.

Rapid Deployment Voice Switch Type I ← (Voice Communication) → Small Tower Voice Switch

This interface enables ATC voice communication between controllers in different facilities.

Rapid Deployment Voice Switch Type I ← (Voice Communication) → Ultra High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Rapid Deployment Voice Switch Type I ← (Voice Communication) → Ultra High Frequency Ground Radios - Replacement

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Rapid Deployment Voice Switch Type I ← (Voice Communication) → Very High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Rapid Deployment Voice Switch Type I ← (Voice Communication) → Voice Switching and Control System

This interface enables ATC voice communication between controllers in different facilities.

Rapid Deployment Voice Switch Type I ← (Voice Communication) → Voice Switching and Control System Modification (Technological Refresh)

This interface enables ATC voice communication between controllers in different facilities.

Rapid Deployment Voice Switch Type II — (Voice Communication) → Digital Voice Recorder System

This interface records and temporarily archives voice transmissions.

Rapid Deployment Voice Switch Type II ← (Voice Communication) → Multi-Mode Digital Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Rapid Deployment Voice Switch Type II ← (Voice Communication) → Rapid Deployment Voice Switch Type II

This interface enables ATC voice communication between controllers in same or different facilities.

Rapid Deployment Voice Switch Type II ← (Voice Communication) → Rapid Deployment Voice Switch Type IIA

This interface enables ATC voice communication between controllers in different facilities.

Rapid Deployment Voice Switch Type II ← (Voice Communication) → Small Tower Voice Switch

This interface enables ATC voice communication between controllers in different facilities.

Rapid Deployment Voice Switch Type II ← (Voice Communication) → Ultra High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Rapid Deployment Voice Switch Type II ← (Voice Communication) → Ultra High Frequency Ground Radios - Replacement

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Rapid Deployment Voice Switch Type II ← (Voice Communication) → Very High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Rapid Deployment Voice Switch Type II ← (Voice Communication) → Voice Switching and Control System

This interface enables ATC voice communication between controllers in different facilities.

Rapid Deployment Voice Switch Type II ← (Voice Communication) → Voice Switching and Control System Modification (Technological Refresh)

This interface enables ATC voice communication between controllers in different facilities.

Rapid Deployment Voice Switch Type IIA — (Voice Communication) → Digital Voice Recorder System

This interface records and temporarily archives voice transmissions.

Rapid Deployment Voice Switch Type IIA ← (Voice Communication) → Multi-Mode Digital Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Rapid Deployment Voice Switch Type IIA ← (Voice Communication) → Rapid Deployment Voice Switch Type IIA

This interface enables ATC voice communication between controllers in same or different facilities.
Rapid Deployment Voice Switch Type IIA ⇐ (Voice Communication) ⇒ Small Tower Voice Switch
This interface enables ATC voice communication between controllers in different facilities.
Rapid Deployment Voice Switch Type IIA ⇐ (Voice Communication) ⇒ Ultra High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Rapid Deployment Voice Switch Type IIA ⇐ (Voice Communication) ⇒ Ultra High Frequency Ground Radios - Replacement
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Rapid Deployment Voice Switch Type IIA ⇐ (Voice Communication) ⇒ Very High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Rapid Deployment Voice Switch Type IIA ⇐ (Voice Communication) ⇒ Voice Switching and Control System
This interface enables ATC voice communication between controllers in different facilities.
Rapid Deployment Voice Switch Type IIA ⇐ (Voice Communication) ⇒ Voice Switching and Control System Modification (Technological Refresh)
This interface enables ATC voice communication between controllers in different facilities.
Small Tower Voice Switch — (Voice Communication) ⇒ Digital Voice Recorder System
This interface records and temporarily archives voice transmissions.
Small Tower Voice Switch ⇐ (Voice Communication) ⇒ Multi-Mode Digital Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Small Tower Voice Switch ⇐ (Voice Communication) ⇒ Small Tower Voice Switch
This interface enables ATC voice communication between controllers in same or different facilities.
Small Tower Voice Switch ⇐ (Voice Communication) ⇒ Ultra High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Small Tower Voice Switch ⇐ (Voice Communication) ⇒ Ultra High Frequency Ground Radios - Replacement
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Small Tower Voice Switch ⇐ (Voice Communication) ⇒ Very High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Small Tower Voice Switch ⇐ (Voice Communication) ⇒ Voice Switching and Control System
This interface enables ATC voice communication between controllers in different facilities.
Small Tower Voice Switch ⇐ (Voice Communication) ⇒ Voice Switching and Control System Modification (Technological Refresh)
This interface enables ATC voice communication between controllers in different facilities.
Ultra High Frequency Ground Radios ⇐ (Voice Communication) ⇒ Ultra High Frequency Airborne Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Ultra High Frequency Ground Radios - Replacement ⇐ (Voice Communication) ⇒ Ultra High Frequency Airborne Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Very High Frequency Ground Radios ⇐ (Voice Communication) ⇒ Very High Frequency Airborne Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Very High Frequency Ground Radios ⇐ (Voice Communication) ⇒ Very High Frequency Mobile Radios
Voice communication providing ATC coordination and direction between controllers and pilots and between controllers and ground vehicle operators.
Very High Frequency Ground Radios ⇐ (Voice Communication) ⇒ Very High Frequency Multi-Mode Airborne Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Voice Switching and Control System — (Voice Communication) ⇒ Digital Voice Recorder System
This interface records and temporarily archives voice transmissions.
Voice Switching and Control System ⇐ (Voice Communication) ⇒ Multi-Mode Digital Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Voice Switching and Control System ⇐ (Voice Communication) ⇒ Ultra High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Voice Switching and Control System ⇐ (Voice Communication) ⇒ Ultra High Frequency Ground Radios - Replacement
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Voice Switching and Control System ⇐ (Voice Communication) ⇒ Very High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Voice Switching and Control System ⇐ (Voice Communication) ⇒ Voice Switching and Control System
This interface enables ATC voice communication between controllers in same or different facilities.
Voice Switching and Control System ⇐ (Voice Communication) ⇒ Voice Switching and Control System Modification (Technological Refresh)
This interface enables ATC voice communication between controllers in different facilities.
Voice Switching and Control System Modification (Technological Refresh) — (Voice Communication) ⇒ Digital Voice Recorder System
This interface records and temporarily archives voice transmissions.
Voice Switching and Control System Modification (Technological Refresh) ⇐ (Voice Communication) ⇒ Multi-Mode Digital Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Voice Switching and Control System Modification (Technological Refresh) ⇐ (Voice Communication) ⇒ Ultra High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Voice Switching and Control System Modification (Technological Refresh) ⇐ (Voice Communication) ⇒ Ultra High Frequency Ground Radios - Replacement
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Voice Switching and Control System Modification (Technological Refresh) ⇐ (Voice Communication) ⇒ Very High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Voice Switching and Control System Modification (Technological Refresh) ⇐ (Voice Communication) ⇒ Voice Switching and Control System Modification (Technological Refresh)
This interface enables ATC voice communication between controllers in same or different facilities.

Issues

none identified

Service Group Air Traffic Services

Service ATC-Separation Assurance

Capability Aircraft-Terrain-Obstacles

Operational Improvement

Use Improved Terrain Information To Share Responsibility For Aircraft To Terrain Separation (102203)

Flight Crews and single-pilot operations monitor cockpit information that provides increased situational awareness of position, altitude, weather, and other essential data that contribute to safety. Automated systems consolidate essential and timely information that is valuable to the pilot. Pilots receive comprehensive databases that reflect terrain and obstacles, fixed and temporary, to provide continuous updates, rather than the 28-day updates in the current architecture. Satellite position reports show the aircrafts actual position on moving maps in the cockpit to provide pilots a more complete picture of the aircraft-to-ground environment to reduce controlled flight into terrain.

30-Jun-2015 to 31-Jan-2023

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Flight crews and single-pilot operations monitor cockpit information for increased situational awareness of position, altitude, weather, and other essential data that contribute to safety (ground based transceiver, surveillance data processor). Automated systems consolidate essential and timely information that is valuable to the pilot (System Wide Information Management, Aeronautical Information Manual). Comprehensive databases that reflect terrain and obstacles-fixed and temporary-provide the pilot continuous updates electronically, versus the 28-day updates in the current architecture. Satellite position reports depict the aircraft's actual position on moving maps shown in the cockpit to provide pilots a more complete picture of aircraft-to-ground environment to reduce controlled flight into terrain. For aircraft equipped to monitor true height above the surface and that have onboard databases, service providers can issue clearances for routings that are more direct than those provided by the more conservative minimum safe altitude airspace designations, in which with the flight deck shares responsibility for maintaining separation from the terrain.

Benefits

Since the flight deck can accurately monitor the relationship of the aircraft to the terrain, the service provider can issue clearances for more direct routings in which the flight deck is responsible for maintaining clearance from terrain along the path. This allows greater flight efficiency in the route of flight for the pilot (time and fuel), while the controller can issue direct clearances versus multiple navigational aid fix/intersection clearances. The pilot benefits through increased situational awareness (location and altitude) and operating efficiency while the service provider reduces workload, since the aircraft routing is more direct and the aircraft requires less monitoring.

Systems

Aeronautical Information Management (key system)

The AIM system represents the evolution of the acquisition, storage, processing and dissemination of aeronautical information in the NAS. Aeronautical information is defined as any information concerning the establishment, condition, or change in any component (facility, service, or procedure of, of hazard) of the National Airspace System. Aeronautical information comes in two types a somewhat static type, and a more dynamic type. The static portion represents the aeronautical information baseline as a particular date, while the dynamic portion updates particular aspects of the static portion due to system impacts or events. The Static portion represents data that NAS automation systems and other users use to adapt their software to properly operate. The dynamic portion represents information typically contained in NOTAMs that indicate short-term changes to the static data.

Many NAS systems support the acquisition, generation, and dissemination of the static aeronautical information. Information of this type includes airspace structures, airways, locations of NAS facilities, inter-facility letters of agreement and memorandums of understanding, obstructions, standard procedures, airspace charts, etc.

Several NAS systems also support the acquisition, generation, processing, and dissemination of the dynamic aeronautical information. Information of this type includes, facility outages, runway closures, temporary flight restrictions, airspace constraints, SIGMETs, etc. This information must be disseminated to users and providers of air traffic services in a timely and efficient manner.

AIM will provide the central point for the dissemination of high quality, configuration controlled information to NAS systems, service providers and users of the NAS. AIM will disseminate data based on the Aeronautical Information Exchange Model (AIXM) protocols.

Air Route Surveillance Radar - Model 1E

The Air Route Surveillance Radar - Model 1E (ARSR-1E) is a 1970s analog radar. It is a long-range radar system with a maximum detection range of 200 nm. The ARSR-1E is a surveillance system used to detect azimuth and slant range of en route aircraft operating between terminal areas. It also provides weather intensity data.

Air Route Surveillance Radar - Model 2

The Air Route Surveillance Radar - Model 2 (ARSR-2) is a 1970s analog radar. It is a long-range radar system with a maximum detection range of 200 nm. The ARSR-2 is a surveillance system used to detect azimuth and slant range of en route aircraft operating between terminal areas. It also provides weather intensity data.

Air Route Surveillance Radar - Model 3

The Air Route Surveillance Radar - Model 3 (ARSR-3) is a 1980s radar that provides primary long range surveillance data, including slant range and azimuth data. It processes the returns which includes demodulation, analog-to-digital conversion, moving target indicator function, sensitivity time control, range and azimuth gating, and digital target extraction - all of which are performed digitally (with the exception of the demodulation and analog-to-digital conversion). In addition, the ARSR-3 has a weather channel with associated processing to provide weather contour information in digital format.

Air Route Surveillance Radar - Model 4

The Air Route Surveillance Radar - Model 4 (ARSR-4) is a three-dimensional, long-range, rotating phased array, primary surveillance radar with integrated height finder capability. It is part of the joint surveillance system (JSS) used in conjunction with ARSR-3 coverage as part of the nationwide air defense command surveillance network. In addition to functions peculiar to the military, the ARSR-4 performs the same basic functions of the ARSR-3, by providing primary long-range surveillance data, including slant range and azimuth data.

Air Traffic Control Beacon Interrogator - Model 6

The Air Traffic Control Beacon Interrogator Model 6 (ATCBI-6) is a ground-based system that interrogates transponders, receives and processes replies from transponders, determines the range and azimuth to the aircraft, and forwards the information to appropriate air traffic control (ATC) automation systems. Replies provide identification and altitude data of the transponder.

Airport Surveillance Radar - Model 11

The Airport Surveillance Radar- Model 11 (ASR-11) is a digital, combined primary and secondary surveillance radar (SSR), short-range radar system with a 60 nautical mile (nmi) detection range for medium and small activity airports. The ASR-11 provides advanced digital primary radar including weather intensity surveillance with an integrated monopulse SSR system for use in the airport terminal area. The ASR-11 is used to detect and report the presence and location of an aircraft in a specific volume of airspace. The ASR-11 provides search radar surveillance coverage in controlled airspace primarily in terminal areas.

Airport Surveillance Radar - Model 7

The Airport Surveillance Radar - Model 7 (ASR-7) is a short-range (60 nm) analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the Air Traffic Control Beacon Interrogator - Model 4 or Model 5 (ATCBI-4 or ATCBI-5) or Mode S. This system will be replaced by the ASR-11.

Airport Surveillance Radar - Model 8

The Airport Surveillance Radar - Model 8 (ASR-8) is a short-range (60 nm), analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the Air Traffic Control Beacon Interrogator - Model 4 or Model 5 (ATCBI-4 or ATCBI-5) or Mode S.

Airport Surveillance Radar - Model 9

The Airport Surveillance Radar - Model 9 (ASR-9) is a short range (60 nm) radar system for the airport terminal area. The ASR-9 processes the returns from aircraft targets, which includes demodulation, analog-to-digital conversion, range and azimuth gating, sensitivity timing control, and a moving target detection function. The moving target detector includes two-level weather contour processing, digital signal processing, correlation and interpolation processing, and surveillance processing. The ASR-9 has a separate weather channel with associated processing capable of providing six-level weather contours. The two-level weather contour processing associated with the moving target detector is only be used for backup. The six-level weather channel is primarily used to supplement Next Generation Weather Radar (NEXRAD) coverage. It is normally used in conjunction with Mode Select (Mode S) but it can accommodate an Air Traffic Control Beacon Interrogator Model 4/5 (ATCBI-4/5).

The ASR-9 will be upgraded/replaced with the ASR-9/Mode S SLEP (see separate mechanism) in the 2007-12 time frame.

Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program)

The Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) (ASR-9/Mode S (SLEP)) mechanism provide the necessary technical refresh to extend the service life of the ASR-9 and Mode S through 2030. The ASTERIX upgrade has not been implemented, but will be implemented at a later date.

Automated Radar Terminal System - Model IIE

The Automated Radar Terminal System - Model IIE (ARTS IIE) provides radar data processing (RDP) and decision support tools to the controller in the terminal environment. Utilized at low to medium-size Terminal Radar Control (TRACONs) Facilities the ARTS IIE is capable of receiving input from up to 2 sensors, can process up to 256 tracks simultaneously, and support up to 22 displays. The ARTS IIE implements the Common ARTS software for improved performance maintenance efficiency. The radar data processing (RDP) software provides automated surveillance tracking and display processing. Included in the ARTS IIE software are decision support tools such as Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Mode C intruder alert, Converging Runway Display Aid (CRDA), and Controller Automation Spacing Aid (CASA).

Automated Radar Terminal System Software

Provides maintenace of the Automated Radar Terminal System Software (ARTS S/W) for ARTS IIE, ARTS IIIA and ARTS IIIE. Functions include radar data processing (RDP), Minimum Safe Altitude Warning (MSAW); controller automated spacing tool, Converging Runway Display Aid (CRDA), Final Approach Monitor (FMS), and other tools to assist the terminal and tower controllers to manage the air traffic in the terminal area.

Automated Radar Terminal System Software Modification (All Purpose Structured Eurocontrol Information Exchange, etc,)

Automated Radar Terminal System Software Modification (All Purpose Structured Eurocontrol Information Exchange (ASTERIX), etc,), (ARTS S/W Mod (ASTERIX, etc)). Modification to the ARTS software that will add capabilities including weather product integration on the displays, processing of ASTERIX formatted surveillance data, improved traffic management and surveillance data processing, Ground-Initiated Communications Broadcast (GICB), and terminal data link functionality.

Automatic Dependent Surveillance (Capstone) Ground Station

The Automatic Dependent Surveillance (Capstone) Ground Station (ADS (Cap) Ground Station) is a demonstration system used by the Capstone project under Safe Flight 21. It receives Global Positioning System (GPS)-derived aircraft four (4)-dimensional position data, aircraft identification, aircraft velocity, and other selected aircraft data for processing at ATC facilities, and transmits Traffic Information System - Broadcast (TIS-B) information on aircraft in areas of radar coverage (and other airspace status information when available) to properly to equipped aircraft, to support operational trials. These ground stations are located in remote locations in Alaska, and feed the Anchorage Air Route Traffic Control Center (ARTCC) automation system.

Automatic Dependent Surveillance (Safe Flight 21) Ground Station

The Automatic Dependent Surveillance (Safe Flight 21) Ground Station (ADS (SF-21) Ground Station) is a demonstration system used by the Ohio Valley project under the Safe Flight 21 program. It receives Global Positioning System (GPS)-derived aircraft four (4)-dimensional position data, aircraft identification, aircraft velocity, and other selected aircraft data for processing at selected ATC facilities, and transmits Traffic Information System - Broadcast (TIS-B) information on aircraft in areas of radar coverage (and other airspace status information when available) to properly to equipped aircraft, to support SF-21 operational trials. These ground stations will be located in the regions surrounding Memphis, TN and Louisville, KY, and interface with developmental surveillance processing systems.

Automatic Dependent Surveillance - Broadcast (Capstone) Avionics

Automatic Dependent Surveillance - Broadcast (Capstone) Avionics (ADS-B (Cap) Avionics) are the surveillance avionics used by the Capstone project under Safe Flight 21. These are demonstration avionics that are used to support ADS-B-related operational trials in Alaska.

Automatic Dependent Surveillance - Broadcast Avionics (key system)

Automatic Dependent Surveillance-Broadcast Avionics (ADS-B Avionics) transmits and receives Global Positioning System (GPS)-derived aircraft 4-dimensional position data, aircraft identification, aircraft velocity, and other selected aircraft data. Augmented GPS data may be required for certain applications. This is intended to be a surveillance system and not an avoidance system. The broadcast of own position is automatic and is intended to provide surveillance information to other users. The aircraft or vehicle originating the broadcast may not have knowledge of which users are receiving its broadcast. The ADS-B avionics are designed to transmit this 4-dimensional position data of own aircraft or vehicle and to also receive same type of information from others that are similarly equipped to receive and process ADS-B surveillance information.

BSGS Broadcast Services Ground Station (key system)

The BSGS (Broadcast Services Ground Station) supports Air-Ground broadcast services. This includes the reception of ADS-B from equipped aircraft/vehicles and the transmission of Traffic Information Service-Broadcast (TIS-B) and Flight Information Service-Broadcast (FIS-B) for use by equipped aircraft. Generally, the BSGS will interface via the SDN to provide ADS-B information to ATC automation and receive TIS-B and FIS-B information from TIS-B and FIS-B servers. The BSGS includes antenna(s), one or more dual link (i.e., 1090 MHz Extended Squitter-1090ES and Universal Access Transceiver-UAT) Ground Based Transceiver(s)(GBT), processing functions and communications functions. Several configurations of the BSGS are required to support variations in the geographic service volume and functions to be supported at specific categories of operational sites. BSGSs will be installed at 448 airports and 100 en route locations. Included are those airports equipped with Secondary Surveillance Radar (SSR) and about 140 additional towered airports (currently without SSR). The BSGS will support ADS-B and TIS-B services via both the 1090ES link and by the UAT link. The BSGS will also support FIS-B via the UAT link. BSGSs incorporate a multilink gateway function that provides ADS-B rebroadcasts via the ADS-B alternate link. A BSGS incorporating 2 GBTs are required for airport surface and terminal surveillance coverage at each of 268 smaller airports, a BSGS incorporating 3 GBTs (on average) are required at 120 of the mid-sized airports, and a BSGS incorporating 6 GBTs (on average) are required at the 60 largest airport (those equipped with ASDE-X or ASDE-3 surface surveillance systems).

The following BSGS functions are required to support the various categories of NAS BSGS sites, except as noted below: (1) 1090ES and UAT receive/transmit (i.e., the GBT funnction); (2) multi-link gateway function; (3) process received ADS-B messages and output (via the SDN) ADS-B reports for use by ATC automation; (4) accept TIS-B and FIS-B information from ground TIS-B/FIS-B servers and manage the generation and broadcast of link specific TIS-B messages via the 1090ES and UAT links and FIS-B messages via the UAT link.

The following BSGS configurations are assumed based on the category of the operational site. Except as noted below all BSGS configuration support the above described functions.

En route (100 sites): (1) One multi-sector antenna with each sector connected to the individual 1090ES and UAT receivers. Supports up to 250 nmi. ADS-B reception. En route locations that are intended to provide only low-altitude gap filler coverage do not require the long-range capability. (2) One omni-directional transmit antenna. Transmitter power sized to support the required TIS-B and FIS-B coverage for that specific site.

Terminal/Airport without ASDE-X (415 airports incl. 27 ASDE-3 equipped airports) with each site having: (1) BSGS with at least 2 GBTs with omni-directional antennas sited for both airport surface and terminal airspace coverage; (2) additional GBTs as needed to provide coverage of the primary airport surface movement area.

Terminal/Airport with ASDE-X (26 ASDE-X plus 7 upgraded ASDE-3 airports with an average of 6 GBTs per BSGS): (1) ASDE-X ground stations upgraded to support GBT functionality; (2) At least two of the GBTs provide ADS-B coverage to the edge of the terminal airspace and the TIS-B coverage; (3) ASDE provides the surveillance data source to support TIS-B for surface traffic.

Cockpit Display of Traffic Information Avionics (key system)

The Cockpit Display of Traffic Information Avionics (CDTI Avionics) is a generic name for a display that provides the flight crew with surveillance information about other proximate aircraft, including their position. It enables pilots to electronically "see and avoid" other aircraft.

Communications Management System

The CMS Management and Control function performs tasks for overall management and control of all air/ground and ground/ground voice and data communications to support System Wide Information Management (SWIM). CMS will also incorporate a reconfiguration control function to support reconfigurable airspace assignments, data routing, and a digital recording for both voice and data.

The En Route Automation Modernization program has assumed the data recording function via the Standard Automation Platform, and the Digital Voice Recorder System performs the voice recording function. The CMS routing function is a data router that ensures transport of data communications among Air Traffic Control facilities and users of SWIM. Additionally, CMS integrates functionalities inherently provided by the voice switches, the voice recorders, and the ATN Router.

Digital Airport Surveillance Radar

The Digital Airport Surveillance Radar (DASR) provides advanced digital primary radar including weather intensity surveillance with an integrated mono-pulse Secondary Surveillance Radar (SSR) system for use in the airport terminal area. (Military version of ASR-11)

Digital Bright Radar Indicator Tower Equipment

The Digital Bright Radar Indicator Tower Equipment (DBRITE) is a tower display system that provides a raster scan presentation of radar/beacon videos and automation system alphanumeric data. The system accepts radar, beacon, external map, analog data, and automation system data.

Digital Voice Recorder System Replacement

The Digital Voice Recorder System Replacement (DVRS Replacement) is a modern digital system used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

Emergency Voice Communications System

The Emergency Voice Communications System (EVCS) is located at Headquarters (HQ), Regional Offices, several Air Route Traffic Control Centers (ARTCCs), Terminal Radar Approach Control (TRACON) facilities, and other selected sites. EVCS uses two (2) dedicated Federal Telecommunications Service 2001 (FTS2001) dial access channels at most FAA locations. Dedicated dial lines using the Public Switched Telephone Network (PSTN) are used at locations not having direct access to FTS2001. Supports HQ and Regional Communications Command Centers'' functions for accident and incident reports, hijacks, aircraft crashes, aviation security matters, military activities, natural disasters, etc.

En Route Next Generation Secondary Surveillance Radar

En Route Next Generation Secondary Surveillance Radar (En Route (NEXGEN SS-ER)) is a future generation surveillance system capable of providing cooperative surveillance capabilities commensurate with the technology at the time.

Enhanced Back-up Surveillance

The Enhanced Back-Up Surveillance (EBUS) system replaces the DARC system in use at the 20 Air Route Traffic Control Centers (ARTCC) in the contiguous United States (CONUS), the William J. Hughes Technical Center (WJHTC), and the FAA Academy (FAAAC). The EBUS design employs the existing FAA-certified software of the Microprocessor En Route Automated Radar Tracking System (Micro-EARTS) application to provide radar data processing (RDP) services for the replacement legacy backup system. Micro-EARTS provides key capabilities not supported by the DARC legacy system it replaces, among which are the safety functions of Conflict Alert (CA), Mode-C Intruder (MCI), and Minimum Safe Altitude Warning (MSAW). EBUS also provides Next Generation Radar (NEXRAD) weather data to R-position users via the DSR Backup Communications Network (BCN). EBUS makes the R-position functionality on the backup channel more comparable to that of the primary channel.

The EBUS software (Micro EARTS) and the ECG backup gateway software will share the same hardware platform such that both software functions will reside in the same ECG backup gateway hardware platform.

Enhanced Terminal Voice Switch

The Enhanced Terminal Voice Switches (ETVS) are installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) facilities with more than four air traffic controller positions. The ETVS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The ETVS (installed in the ATCT) provides the ATC operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the ETVS.

The ETVS (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within a TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the ETVS.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate ETVS systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Fixed Position Surveillance - Model 117

The Fixed Position Surveillance - Model 117 (FPS-117) radar is a joint-use military surveillance system used by the FAA to detect slant range and azimuth of en route aircraft. These radars are located in Alaska (12) and Hawaii (1), and are expected to be sustained until at least 2020.

Fixed Position Surveillance Model 20 Series

The Fixed Position Surveillance Model 20 Series (FPS-20 Series) is a military primary radar of various models (FPS-20A, FPS-64, FPS-66A, FPS-67/A/B, and ARSR-60M) used by the FAA to detect slant range and azimuth of en route aircraft operating between terminals in the continental United States. Each of the different radar models is a similar variation of the original FPS-20 military radar.

Flexible Voice Switch (key system)

Voice communications is the primary means of communications among ATC facilities and between an Air Traffic Control Specialist (ATCS) and a pilot. Voice switching provides the ATCS both G/G Interfacility/Intrafacility and A/G voice communications connectivity. The NAS Voice Switch (NVS) program will replace aging voice switches and their analog interfaces with modern digital voice switches consisting of digital interfaces. The Flexible Voice Switch will be the common platform and baseline voice switch for all NAS domains with modularity and scalability to meet communications connectivity requirements. Additionally, this switch will be expandable to accommodate growth capacity requirements and able to support NAS Modernization needs as described in various Operational Improvements.

Full Digital Automated Radar Terminal System Display

Full Digital ARTS Display (FDAD) is the fully digital ARTS display system that provides the display and data input devices for terminal controllers using ARTS IIIE and ARTS IIIA. The FDAD can work in analog video time share mode or full digital mode. The present application is analog video time share mode.

Heating, Ventilation and Air Conditioning - Long-Range Radar

The Heating, Ventilation and Air Conditioning - Long-Range Radar (HVAC - LRR) mechanism provides the systems to maintain the temperature and relative humidity within the facility at acceptable levels for LRR system operation or personnel comfort as required. This includes filtering of air to Occupational Safety and Health Administration (OSHA) requirements.

High Frequency Airborne Radios

High Frequency (HF) Airborne Radios are analog (HF multi-channel radio transceivers operating in the 2 - 30 Mhz frequency band installed in airborne commercial, cargo, and military aircraft transiting the oceanic, en route, terminal, or flight service station airspace domains. These transceivers are typically used in transoceanic applications.

Low-Density Radio Communications Link

The Low-Density Radio Communications Link (LDRCL) is an FAA owned Low-Density Radio Communications Link (LDRCL) satisfies short-haul, low-density communication requirements. It provides user access (via tail circuits) to a Radio Communications Link (RCL) site or connectivity between two operational facilities

Multi-Mode Digital Radios

Multi-Mode Digital Radios (MDRs) are ground-based Very High Frequency (VHF) air-traffic-control radios that can operate in several configurations: 1) analog voice with 25kHz channel spacing; 2) analog voice with 8.33 kHz channel spacing; and 3) VHF Data Link (VDL) Mode-3 which consists of two-way digital voice and data communication.

Radar Automated Display System

The Radar Automated Display System (RADS) is the Air Traffic Controller workstation for the Automated Radar Terminal System Model IIE (ARTS IIE).

Radio Communication Link

Radio Communication Link (RCL) is an integrated voice and data microwave transmission system designed to provide the FAA with cost effective and reliable service for its high capacity NAS communications routes. RCL interconnects air route traffic control center (ARTCC) facilities with long range radar installations and other air traffic control (ATC) facilities.

Radio Control Equipment

Radio Control Equipment (RCE), located at both ATC facilities and remote communication sites, control the operation of remotely located ground to air Very High Frequency/Ultra High Frequency (VHF/UHF) radios used by air traffic controllers to communicate with pilots. RCE interfaces with the voice switch at the ATC facility, telephone landlines, and ground to air radios at the En Route Remote Communications Air/Ground (RCAG) sites, Terminal Remote Transmitter/Receiver (RTR) sites, and Flight Service Station Remote Communications Outlet (RCO) sites.

Rapid Deployment Voice Switch Type II

The Rapid Deployment Voice Switch Type II (RDVS II) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS II (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the RDVS II. The RDVS II (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the RDVS II.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS II systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Remote Automated Radar Terminal System (ARTS) Color Display

Remote Automated Radar Terminal System Color Display (R-ACD) Description The Remote - Automated Radar Terminal System (ARTS) Color Display (ACD) is a high performance, full function, and color display providing air traffic controllers with the functionality of the Digital Bright Radar Indicator Tower Equipment (DBRITE). This display supports keyboard and trackball functions for the ARTS II, ARTS IIE, and ARTS IIIE. A radar gateway function will be incorporated to provide a primary and secondary radar data path to the R-ACD in the event of failure of both the ARTS II and ARTS IIIA processing systems.

Satellite Communication Airborne Radios

The Satellite Communication (SATCOM) airborne radios are transceivers installed in commercial, cargo, and military aircraft transiting in the National Airspace System (NAS) and are used as an alternate means of voice communications between pilots in aircraft and ground controllers. These transceivers are typically used in transoceanic applications.

Satellite Communication Ground Radios

Satellite Communications (SATCOM) Ground Radios are transceivers installed at oceanic and en route facilities to support an alternative means of tactical air traffic control (ATC) voice communications between ground controllers and pilots in aircraft. These transceivers are typically used in transoceanic applications. These transceivers are also installed at regional facilities and used as an alternate means of communications in case of total ground communications failure or between locations in mountainous terrain or where other means of communications are not possible (e.g., Alaska).

Oceanic air to ground satellite communications are provided via a communications service provider. The FAA currently has no plans to develop or implement its own air to ground SATCOM ground radios.

Small Tower Voice Switch

The Small Tower Voice Switch (STVS) is installed in small Airport Traffic Control Towers (ATCT) and in Flight Service Stations (FSS). The basic STVS has four operator positions. The STVS provides the Air Traffic Control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and Air Route Traffic Control Center (ARTCC) controllers/ Terminal Radar Approach Control (TRACON) controllers/FSS specialists/air traffic control system command center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the STVS. The STVS (installed in the FSS) provides the ATC operational G/G voice communications interconnectivity between specialists within an FSS (intercom), interconnectivity between specialists in separate FSSs (interphone), and interconnectivity between FSS specialists and Air Route Traffic Control Center (ARTCC) controllers/Terminal Radar Approach Control (TRACON) controllers/ATCT controllers/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground radio connectivity between FSS specialists and pilots is also supported by the STVS.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate STVS systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Standard Automation Platform Convergence Phase 1 (key system)

The purpose of Standard Automation Platform Convergence Phase 1 (SAP Conv P1) is to reduce both procurement and recurring costs by standardizing and sharing as many hardware and software ATC Automation components as possible.

An engineering convergence task will begin in fiscal year 2005 and run through 2015. All components from each of the automation systems (STARS, ERAM, TFM, etc.) will be analyzed, and the "best of breed" and "core" components will be selected. SAP convergence will be performed in the following areas: (1) Hardware; (2) System Software (operating systems, Commercial-Off-The-Shelf tools, etc.); (3) ATC applications that can be shared across domains; (4) ATC applications that are unique to a domain; and (5) ATC system support tools that can be shared across domains (adaptation, data extraction or systems analysis recording, data reduction and analysis tools, etc.). Proven STARS and ERAM components will be slected, integrated into the SAP, and rigorously tested for replacing STARS and ERAM components at or near their end of service life.

Prototyping begun under Phase 1 will continue with SAP Conv P2. The results of both efforts will lead to refining the requirements to develop the SAP WS mechanism with SDP and FOMS applications.

Standard Automation Platform Convergence Phase 2

Standard Automation Platform Convergence Phase 2 (SAP Conv P2) continues with prototyping started under Phase 1 to insure that recurring and technical refresh costs for ATC automation elements are minimized by using as many common components as prossible.

SAP Phase 2 incorporates upgrades and technical refreshes of ATC applications, systems software, and hardware to ensure use of common elements across the terminal, enroute, oceanic, command center, and airport surface ATC Automation domains.

Prototyping will conclude with Phase 2, and the results will lead to refining the requirements for development of the SAP WS mechanism with SDP and FOMS applications.

Standard Automation Platform Workstation Phase 1 (key system)

The SAP consists of the Flight Object Management System (FOMS), the Surveillance Data Processor (SDP), and the SAP Workstation. The SAP will be installed in En Route and Arrival/Departure facilities. The SDP performs surveillance data processing and tracking on Surveillance Data Objects received from the Surveillance Data Network. The FOMS performs flight plan processing, associates flight and track data, and publishes the Flight Object on the System Wide Information Management network. The SAP workstation provides the controller interface for the FOMS and SDP.

Standard Automation Platform Workstation Phase 2

Provides a Technical Refresh of SAP Workstation Phase 1. The SAP consists of the Flight Object Management System (FOMS), the Surveillance Data Processor (SDP), and the SAP Workstation. The SAP will be installed in En Route and Arrival/Departure facilities. The SDP performs surveillance data processing and tracking on Surveillance Data Objects received from the Surveillance Data Network (SDN). The FOMS performs flight plan processing, associates flight and track data, and publishes the Flight Object on the System Wide Information Management network. The SAP workstation provides the controller interface for the FOMS and SDP.

Standard Terminal Automation Replacement System Tower Display Workstation

The Standard Terminal Automation Replacement System Tower Display Workstation (STARS TDW) provides the interface between the ATC Towerl (ATCT) controller and the STARS processing unit.

Surveillance Data Network (key system)

National Airspace System (NAS) surveillance systems, including radar and automatic dependent surveillance systems will provide surveillance data objects via the Surveillance Data Network (SDN), which is a sub-network of the System Wide Information Management (SWIM) and the FAA Telecommunication Infrastructure (FTI). The published Surveillance Data Objects (SDO) will be made available to NAS and other users, including the Transportation Security Administration, Department of Defense, and others. Surveillance data availability supports 3-mile separation standards, gate-to-gate traffic management, seamless airspace, and dynamic resectorization. Improved surveillance information is provided in a timely and consistent manner seamlessly across the NAS for operations, planning, and decision making. The information will be available to all users and service providers via SDO in near real time. This information enables decisions to be based on a shared common view of situations, even as conditions are changing. Improved surveillance with SDOs will provide the automation higher quality of data for seamless surveillance and, in combination with other capabilities and new procedures, enable capacity and safety improvements. These benefits accrue from increased situation awareness by decision makers and improved operation of decision support and analysis tools that use surveillance information.

Surveillance Data Processor (key system)

SDP is a component of SAP and operates in En Route and Terminal. The SDP will make improvements to sensors and automation systems that will allow for expanded use of 3-mile separation and terminal procedures. The operational improvements enable more efficient control of aircraft and use of airspace. To accomplish this, all 1030/1090 Beacon interrogators will be upgraded to disseminate their existing 1.2 milli-radian azimuth accuracy and other information, such as time of measurement, confidence, quality, and so on. The automation system algorithms will be improved or new algorithms will be developed to exploit the additional information content of the improved surveillance reports. The method of presentation (display) to support 3-mile separation will be developed and tested to ensure safety. The existing long-range sensor surveillance update period is (12 seconds) and is insufficient to support 3-mile separation. In areas where only long-range sensors exist and where the Air Traffic Service requires 3-mile separation, these sensors may be modified to double the update rate to achieve 3-mile separation.

Surveillance Processor (Safe Flight 21)

The Surveillance Processor (Safe Flight 21) is a demonstration system that receives, processes, and distributes surveillance data between Safe Flight 21 (SF-21) architectural elements to support operational trials. The processor receives surveillance data from various sources, including surveillance sensors, Automatic Dependent Surveillance-Broadcast (ADS-B) systems, multilateration systems, Air Traffic Control (ATC) automation systems, and flight plan processing systems. The processor fuses the various surveillance data to create aircraft track data, which is distributed to various SF-21 architectural elements. One of the capabilities supported by the processor is the processing and distribution of Traffic Information Services - Broadcast (TIS-B) information to ADS (SF-21) Ground Stations, for subsequent transmission to aircraft.

System Wide Information Management Build 1B (key system)

Build 1B provides all items in 1A, including more NAS information. This build integrates Flight and Surveillance Information systems into the SWIM architecture.

Ultra High Frequency Airborne Radios

The Ultra High Frequency Avionics (UHF Avionics) are analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225-400 MHz frequency band, which are multi-channel transceivers, installed in an airborne military platform. These airborne devices support the tactical two-way voice communications/ coordination between the military pilot in the military aircraft and the controller on the ground.

Ultra High Frequency Ground Radios

Ultra High Frequency (UHF) Ground Radios are analog UHF amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 Mhz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and flight service station domains.

Ultra High Frequency Ground Radios - Replacement

The Ultra High Frequency Ground Radios - Replacement (UHF Ground Radios - Repl) mechanism represents analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 MHz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and Flight Service Station domains.

Very High Frequency Ground Radios

Very High Frequency (VHF) Ground Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 MHz frequency band which are single-channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the pilot in commercial, cargo, or general aviation aircraft in the oceanic, en route (i.e., ARTCC), terminal (i.e., TRACON/tower), and flight service station domains. Additionally, there are analog VHF frequency modulation (VHF - FM) radio devices operating in the 161 - 174 MHz frequency band that are multi-channel transceivers. These transceivers are used by flight inspection, aviation security, and airway facility specialists supporting local airport operations and maintenance or to perform their operational maintenance mission in support of the NAS. However, these same VHF-FM transceivers are also used to support the resolution of emergency situations or establish a level of voice command and control communications/coordination during disaster recovery.

Very High Frequency Multi-Mode Airborne Radios

Very High Frequency Multi-Mode Airborne Radios (VHF MM Airborne Radios) refers to an airborne radio operating in the very high frequency (VHF) range capable of operating in the following modes: (1)) analog voice (i.e., 25 kHz spacing for use in the United States and other similarly equipped countries); (2) VHF Digital Link Mode 2 (VDL Mode-2) (two-way digital data transmission); (3) VHF Digital Link Mode 3 (VDL Mode-3), (integrated two-way digital voice/data transmission); and (4) analog voice (i.e., 8.33 kHz spacing for use in Europe and other similarly equipped countries).

Voice Switching and Control System

The Voice Switching and Control System (VSCS) is installed in the Air Route Traffic Control Center (ARTCC). The VSCS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The VSCS provides the Air Traffic Control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ARTCC (intercom), interconnectivity between controllers in separate ARTCCs (interphone), and interconnectivity between ARTCC controllers and Terminal Radar Approach Control (TRACON) controllers/Airport Traffic Control Tower (ATCT) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ARTCC controllers and pilots is also supported by the VSCS.

Voice Switching and Control System Modification (Technological Refresh) (key system)

The Tech Refresh for VSCS is a service life extension. The Tech Refresh encompasses workstation upgrade, video display monitor, control equipment power, VSCU supportability, control shelf power supply, and software development demonstration system expansion.

Voice Switching and Control System Training and Backup Switches

Voice Switching and Control System Training and Backup Switch (VTABS) was developed to meet AT requirements for a separate standalone VSCS Backup and Training System. VTABS can be configured as a 50-position switch with the capability to support air traffic operations in the event of VSCS failure, hardware and software maintenance or power loss.

Support Activities

FAA Adaptation for Use Improved Terrain Information To Share Responsibility For Aircraft To Terrain Separation

Many NAS systems incorporate parameters that are adjustable. This allows for the setting of system parameters to optimize performance at each particular site. When new systems that have adjustable parameters are introduced into the NAS, adaptation data must be developed for the system. Environmental and procedural changes may also result in the need to modify FAA Adaptation Data. Generally, adaptation will begin 12 months before IOC and continue until 12 months after IOC.

FAA Airspace Design for Use Improved Terrain Information To Share Responsibility For Aircraft To Terrain Separation

FAA Airspace Design provides the aviation community the description, operational composition, and status of airspace/airport components of the NAS. Generally, airspace design begins six months prior to Initial Operating Capability.

FAA Certification for Use Improved Terrain Information To Share Responsibility For Aircraft To Terrain Separation

FAA certification is an activity necessary to support people and systems in the delivery of NAS services. Avionics and associated systems are deemed to be critical to the safety of flight and must be certificated. In addition certain operators and service providers require to be certified such as pilots, dispatchers and others. Certification will generally begin 24 months prior to Initial Operating Capability, and be complete prior to receiving or giving service.

FAA Rulemaking for Use Improved Terrain Information To Share Responsibility For Aircraft To Terrain Separation

FAA Rulemaking is necessary when Federal Air Regulations require or change the delivery of NAS services. The regulatory process must be complete prior to implement or service provision. The lead time for change vary greatly due to the varieties of scope but will take a minimum of 180 days before implemented.

FAA Spectrum Engineering for Use Improved Terrain Information To Share Responsibility For Aircraft To Terrain Separation

FAA Spectrum Engineering ensures that radio frequency spectrum is available before developing or procuring new communications-electronics systems.

FAA Standards for Use Improved Terrain Information To Share Responsibility For Aircraft To Terrain Separation

FAA standards development is an activity necessary to support people and systems in the delivery of NAS services. FAA Standards establish rules for the measure of quantity, weight, extent, value, or quality.

Non-FAA Certification for Use Improved Terrain Information To Share Responsibility For Aircraft To Terrain Separation

FAA standards are applied to user activities necessary to support people and systems in the delivery of NAS services. Aviation avionics and equipment is deemed to be critical to the safety of flight and must be certificated. It is also necessary to certify aviation personnel compliance with these standards. Certification will generally begin 24 months prior to Initial Operating Capability, and be complete prior to receiving service.

Non-FAA Pilot Procedure Development for Use Improved Terrain Information To Share Responsibility For Aircraft To Terrain Separation

A number of NAS users document the way their activities are to be carried out. The introduction of new systems, or changes to existing systems may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development will generally begin once ATC procedures have been established and be complete by 90 days prior to Initial Operating Capability, in order to facilitate training.

Non-FAA Pilot Training for Use Improved Terrain Information To Share Responsibility For Aircraft To Terrain Separation

Non-FAA Pilot Training is provided to educate pilots as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional pilot training. Training will generally begin 60 days prior to IOC and be complete within one year following Full Operating Capability.

Non-FAA Procedure Development for Use Improved Terrain Information To Share Responsibility For Aircraft To Terrain Separation

A number of NAS users document the way their activities are to be carried out. The introduction of new systems, or changes to existing systems may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development will generally begin once ATC procedures have been established and be complete by 90 days prior to Initial Operating Capability, in order to facilitate training.

People

Aeronautical Charts and Supplements Publication People

The charting of the new airspace and air routes are performed by the FAA National Aeronautical Charting Office. This organization coordinates with the Regional Airspace Manager to publish and distribute aeronautical charts and procedures associated with a newly approved airspace and/or air routes.

Flight Certification Specialist

Flight Certification Specialists support aircraft and aircraft component certification, continued airworthiness monitoring and inspection, and new or revised flight regulations that change operating procedures.

Ground Controller

A Ground Controller performs the following activities: Ensure separation; Control vehicles as well as aircraft on movement areas other than active runways Initiate control instructions; Monitor and operate communications equipment; Utilize tower radar display(s); Utilize alphanumerics; Assist the tower associate controller with coordination; Scan tower cab environment; Ensure computer entries and strip marking are completed for instructions or clearances issued or received; Process and forward flight plan information; Perform any functions of the tower team which will assist in meeting situation objectives; Coordinate with local control for safe and efficient use of runways and movement areas.

Local Controller

A Local Controller performs the following activities: Ensure separation; Control active runways; Initiate control instructions; Monitor and operate communications equipment; Utilize tower radar display(s); Utilize alphanumerics; Assist the tower associate controller with coordination; Scan tower cab environment; Ensure computer entries and strip marking are completed for instructions or clearances issued or received; Process and forward flight plan information; Perform any functions of the tower team which will assist in meeting situation objectives; Coordinate with ground control for safe and efficient use of runways and movement areas.

Non-Radar Controller

A Non-Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate transfer of control, communications, and flight data; Ensure computer entries are completed on instructions or clearances issued or received; Ensure strip marking is completed on instructions or clearances issued or received.

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Radar Controller

A Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate automated handoffs; Assist the radar associate controller with non-automated handoff actions when needed; Assist the radar associate controller in coordination when needed; Scan radar display; Correlate with flight progress strip information; Ensure computer entries are completed on instructions or clearances you issue or receive; Ensure strip marking is completed on instructions or clearances you issue or receive.

Interfaces

Aeronautical Information Management ← (NAS Status Data) → System Wide Information Management Build 1B
"AIM exchanges NAS Status data, including equipment status, airspace schedules and status, contingency routings, and RNP-RNAV routings, with other systems via SWIM.

Aeronautical Information Management — (Weather Data) → System Wide Information Management Build 1B
AIM provides PIREPS for distribution to NAS users via SWIM.

Automatic Dependent Surveillance - Broadcast Avionics ← (Target Data) → Automatic Dependent Surveillance - Broadcast Avionics
Air-to-air ADS-B target data is exchanged between aircraft for use initially as a situation awareness enhancement. This capability will be expanded to other future applications, such as precision approach and landing and self separation.

Automatic Dependent Surveillance - Broadcast Avionics ← (Target Data) → BSGS Broadcast Services Ground Station
The GBT intercepts ADS-B transmissions from aircraft in the coverage area of the GBT. The GBT transmits ADS-B reports it receives down the UAT link back up the 1090 link and vice versa.

Automatic Dependent Surveillance - Broadcast Avionics — (Target Data) → Cockpit Display of Traffic Information Avionics
The ADS-B avionics provides the flight crew surveillance information about other aircraft in the area and is displayed on the CDTI. This information is initially used for enhanced situation awareness and will be expanded to other future applications such as precision approach and landing and self separation.

BSGS Broadcast Services Ground Station — (Weather Data) → Automatic Dependent Surveillance - Broadcast Avionics
ADS-B Avionics (with weather application) can receive FIS weather products broadcasted by the BSGS via an ADS-B data link.

BSGS Broadcast Services Ground Station — (Surveillance Data) → System Wide Information Management Build 1B
The GBT provides ADS-B reports to the SDN for distribution to automation systems and other authorized systems and user.

Surveillance Data Processor — (Surveillance Data) → BSGS Broadcast Services Ground Station
The SDP provides surveillance data for aircraft that are not responding to beacon interrogations or providing ADS-B reports to the GBT for transmission up both the UAT and 1090 links.

Surveillance Data Processor — (Surveillance Data) → Standard Automation Platform Workstation Phase 1
The SDP sends surveillance data to the SAP WS for display to the controller.

System Wide Information Management Build 1B — (Flight Data) → BSGS Broadcast Services Ground Station
FOMS provides the flight object to the GBT for transmission to aircraft via SWIM.

System Wide Information Management Build 1B — (NAS Status Data) → BSGS Broadcast Services Ground Station
"The GBT receives NAS Status Data, including NOTAMS, via SWIM for broadcast to aircraft equipped with UAT communication equipment.

System Wide Information Management Build 1B — (Weather Data) → Standard Automation Platform Workstation Phase 1
The SAP WS receives weather data from SWIM for display to controllers.

System Wide Information Management Build 1B — (Surveillance Data) → Surveillance Data Processor
The SDN distributes surveillance data received from various sensors to NAS automation systems.

Voice Switching and Control System Modification (Technological Refresh) ← (Voice Communication) → Voice Switching and Control System Modification (Technological Refresh)
This interface enables ATC voice communication between controllers in same or different facilities.

Issues

Need to develop a concept of use for clearances that require an aircraft maintain a true altitude above the terrain versus standard baro-altitude clearances? Need to consider what is required for the controller to issue the clearance- pilot request, designation of capability on the flight plan, etc. Need to evaluate the procedures to see determine if the workload associated with monitoring is less than the current resolution merging procedures - does workload reduce or shift from one task to another. Need to determine if direct routing based on aircraft equipage will impact minimum safe altitudes to reflect more of a airway safe altitude used today on published airway structures.

Service Group Air Traffic Services
Service ATC-Separation Assurance
Capability Surface Separation Capability
Operational Improvement

Current Surface Separation (102401)

Separation services on the airport surface prevent taxi conflicts and runway incursions. Separation is based on radio communication, visual acquisition, notes, and monitoring to ensure that taxi clearances do not result in conflicts and to conduct conformance monitoring. At some airports, the airport surface detection equipment radar and the associated display provide increased situational awareness.
01-Jul-2004 to 31-Dec-2008

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

The fundamental purpose of surface separation is to move aircraft safely and efficiently on the airport surface onto active runways and taxiways. Separating aircraft on the airport surface is a shared responsibility. The pilot visually separates aircraft on taxiways with help from the ground controller. Air traffic controllers provide airport traffic control service based only on observed or known traffic and airport conditions. At some airports, controllers provide preventive control service only to aircraft operating under a letter of agreement. Controllers issue advice or instructions only if a situation develops that requires corrective action.

For their part, pilots and vehicle operators use visual cues to operate on and around the airport surface. They are also affected by visual line-of-sight restrictions and fog or heavy precipitation. Some cues include approach landing and taxi/edge lighting systems, airport signs, and lines painted on the runway/taxiway surface for guidance. Pilots and vehicle operators also use other aircraft's lights (tail, wing, and landing lights), radio communications, and standard taxi routes/airport diagrams to help reduce confusion.

Local control and ground control responsibilities include controlling aircraft exiting the runway after touchdown, granting taxi clearance for arrivals and departures, controlling vehicles operating on or crossing taxiways and runways, holding aircraft for departure or for an available gate, granting takeoff clearances, ensuring runway clearance for runway operations, and providing taxiway flow management. Controllers use visual surveillance of controlled aircraft whenever possible. Visual surveillance of aircraft and vehicles is augmented at some high-activity airports by airport surface detection radar displays such as Airport Surface Detection Equipment (ASDE) with Airport Movement Area Safety System (AMASS). AMASS processes surveillance data from the terminal automation system and the ASDE-3 radar to determine the position and velocity of aircraft and vehicles on the airport surface. AMASS also alerts the air traffic controller of potential conflicts between arriving aircraft and vehicles on the surface and among surface traffic. AMASS accomplishes this by comparing the tracks of aircraft on final approach with the movement of vehicles and aircraft on the airport as detected by the ASDE-3. Also at night and during periods of restricted visibility, controllers rely on procedural techniques such as issuing clearance limits and using pilot and vehicle operator position reports.

Benefits

Current operations are provided in the NAS.

Systems

Airport Movement Area Safety System (key system)

The Airport Movement Area Safety System (AMASS) with Airport Surface Detection Equipment (ASDE) provides controllers with automatically generated visual and aural alerts of potential runway incursions and other potential unsafe conditions. AMASS includes the Terminal Automation Interface Unit (TAIU) that processes arrival data from the airport surveillance radar. AMASS adds an automation enhancement to the ASDE-3 and tracks the movement of aircraft and ground vehicles on the airport surface and presents the data to the tower controllers via the ASDE display.

Airport Surface Detection Equipment - Model 3 (key system)

Airport Surface Detection Equipment - Model 3 (ASDE-3) provides primary radar surveillance of aircraft and airport service vehicles on the surface movement area. ASDE-3 is installed at the busiest U.S. airports. Radar monitoring of airport surface operations (ground movements of aircraft and other supporting vehicles) provides an effective means of directing and moving surface traffic. This is especially important during periods of low visibility such as rain, fog, and night operations.

The ASDE-3 will undergo a SLEP to extend its service life through 2015 (see ASDE-3 SLEP), which will enable it to more effectively support AMASS (see) through this same time period.

Airport Surface Detection Equipment - Model 3 Workstation

Airport Surface Detection Equipment - Model 3 Workstation (ASDE-3 Workstation) displays ASDE-3 primary surveillance of aircraft and vehicles on the airport surface. The workstation is part of the ASDE-3 system; therefore, locations and schedules are identical to ASDE-3.

Digital Bright Radar Indicator Tower Equipment (key system)

The Digital Bright Radar Indicator Tower Equipment (DBRITE) is a tower display system that provides a raster scan presentation of radar/beacon videos and automation system alphanumeric data. The system accepts radar, beacon, external map, analog data, and automation system data.

Digital Voice Recorder System (key system)

Provides modern digital voice recording devices used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

In Feburary 2004, the DVRS was upgraded with a 24-channel card, which replaced the 16-channel card. This minor upgrade, called DVR II, was not extended to the systems installed prior to February 2004.

Digital Voice Recorder System Replacement

The Digital Voice Recorder System Replacement (DVRS Replacement) is a modern digital system used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

Emergency Voice Communications System (key system)

The Emergency Voice Communications System (EVCS) is located at Headquarters (HQ), Regional Offices, several Air Route Traffic Control Centers (ARTCCs), Terminal Radar Approach Control (TRACON) facilities, and other selected sites. EVCS uses two (2) dedicated Federal Telecommunications Service 2001 (FTS2001) dial access channels at most FAA locations. Dedicated dial lines using the Public Switched Telephone Network (PSTN) are used at locations not having direct access to FTS2001. Supports HQ and Regional Communications Command Centers'' functions for accident and incident reports, hijacks, aircraft crashes, aviation security matters, military activities, natural disasters, etc.

Enhanced Terminal Voice Switch (key system)

The Enhanced Terminal Voice Switches (ETVS) are installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) facilities with more than four air traffic controller positions. The ETVS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The ETVS (installed in the ATCT) provides the ATC operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the ETVS.

The ETVS (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within a TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the ETVS.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate ETVS systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Flight Data Input/Output (key system)

The Flight Data Input/Output (FDIO) system provides flight progress information for use by the Tower, Terminal Radar Approach Control (TRACON) and Air Route Traffic Control Center (ARTCC) controllers. The FDIO system allows Air Traffic Control (ATC) Specialists to input automated flight data, perform data manipulation, and print flight strips.

Full Digital Automated Radar Terminal System Display (key system)

Full Digital ARTS Display (FDAD) is the fully digital ARTS display system that provides the display and data input devices for terminal controllers using ARTS IIIE and ARTS IIIA. The FDAD can work in analog video time share mode or full digital mode. The present application is analog video time share mode.

Integrated Communications Switching System Type I (key system)

The Integrated Communications Switching System Type I (ICSS I) are installed at Airport Traffic Control Towers (ATCT), Terminal Radar Approach Control (TRACON) facilities, and Automated Flight Service Stations (AFSS).

The ICSS I (installed in the ATCT) provides the air traffic control (ATC) operational ground-ground voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/air traffic control system command center (ATCSCC) specialists. Ground-air radio connectivity between ATCT controllers and pilots is also supported by the ICSS I.

The ICSS I (installed in the TRACON) provides the ATC operational ground-ground voice communications interconnectivity between controllers within TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Ground-air radio connectivity between TRACON controllers and pilots is also supported by the ICSS I.

The ICSS I (installed in the AFSS) provides the ATC operational ground-ground voice communications interconnectivity between specialists within an AFSS (intercom), interconnectivity between specialists in separate AFSSs (interphone), and interconnectivity between Flight Service Station (FSS) specialists and Air Route Traffic Control Center (ARTCC) controllers/TRACON controllers/ATCT controllers/Air Traffic Control System Command Center (ATCSCC) specialists. Ground-air radio connectivity between AFSS specialists and pilots is also supported by the ICSS I.

Integrated Communications Switching System Type II

The Integrated Communications Switching System Type II (ICSS II) are installed at Airport Traffic Control Towers (ATCT), Automated Flight Service Stations(AFSS), and Terminal Radar Approach Control (TRACON) facilities.

The ICSS II (installed in the ATCT) provides the air traffic control (ATC) operational ground-ground voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Ground-air radio connectivity between ATCT controllers and pilots is also supported by the ICSS II.

The ICSS II (installed in the TRACON) provides the ATC operational ground-ground voice communications interconnectivity between controllers within TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC)) controllers/ Flight Service Station (FSS) specialists/air traffic control system command center (ATCSCC) specialists. Ground-air radio connectivity between TRACON controllers and pilots is also supported by the ICSS II.

Leased Inter-facility National Airspace System Communication System

The Leased Inter-facility National Airspace System Communication System (LINCS) provides transmission channels of various industry-standard types between any specified end points, used to satisfy all FAA operational and some administrative telecommunication requirements.

Multi-Mode Digital Radios (key system)

Multi-Mode Digital Radios (MDRs) are ground-based Very High Frequency (VHF) air-traffic-control radios that can operate in several configurations: 1) analog voice with 25kHz channel spacing; 2) analog voice with 8.33 kHz channel spacing; and 3) VHF Data Link (VDL) Mode-3 which consists of two-way digital voice and data communication.

Radar Automated Display System (key system)

The Radar Automated Display System (RADS) is the Air Traffic Controller workstation for the Automated Radar Terminal System Model IIE (ARTS IIE).

Radio Control Equipment (key system)

Radio Control Equipment (RCE), located at both ATC facilities and remote communication sites, control the operation of remotely located ground to air Very High Frequency/Ultra High Frequency (VHF/UHF) radios used by air traffic controllers to communicate with pilots. RCE interfaces with the voice switch at the ATC facility, telephone landlines, and ground to air radios at the En Route Remote Communications Air/Ground (RCAG) sites, Terminal Remote Transmitter/Receiver (RTR) sites, and Flight Service Station Remote Communications Outlet (RCO) sites.

Rapid Deployment Voice Switch Type I (key system)

The Rapid Deployment Voice Switch Type I (RDVS I) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS I (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center

(ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the RDVS I. The RDVS I (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the RDVS I.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS I systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Rapid Deployment Voice Switch Type II (key system)

The Rapid Deployment Voice Switch Type II (RDVS II) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS II (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the RDVS II. The RDVS II (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the RDVS II.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS II systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Rapid Deployment Voice Switch Type IIA (key system)

The Rapid Deployment Voice Switch Type IIA (RDVS IIA) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS IIA (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. The RDVS IIA also supports air-to-ground (A/G) radio connectivity between ATCT controllers and pilots. The RDVS IIA (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between TRACON controllers and pilots is also supported by the RDVS IIA.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS IIA systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Satellite Communication Ground Radios

Satellite Communications (SATCOM) Ground Radios are transceivers installed at oceanic and en route facilities to support an alternative means of tactical air traffic control (ATC) voice communications between ground controllers and pilots in aircraft. These transceivers are typically used in transoceanic applications. These transceivers are also installed at regional facilities and used as an alternate means of communications in case of total ground communications failure or between locations in mountainous terrain or where other means of communications are not possible (e.g., Alaska).

Oceanic air to ground satellite communications are provided via a communications service provider. The FAA currently has no plans to develop or implement its own air to ground SATCOM ground radios.

Small Tower Voice Switch (key system)

The Small Tower Voice Switch (STVS) is installed in small Airport Traffic Control Towers (ATCT) and in Flight Service Stations (FSS). The basic STVS has four operator positions. The STVS provides the Air Traffic Control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and Air Route Traffic Control Center (ARTCC) controllers/ Terminal Radar Approach Control (TRACON) controllers/FSS specialists/air traffic control system command center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the STVS. The STVS (installed in the FSS) provides the ATC operational G/G voice communications interconnectivity between specialists within an FSS (intercom), interconnectivity between specialists in separate FSSs (interphone), and interconnectivity between FSS specialists and Air Route Traffic Control Center (ARTCC) controllers/Terminal Radar Approach Control (TRACON) controllers/ATCT controllers/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground radio connectivity between FSS specialists and pilots is also supported by the STVS.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate STVS systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Ultra High Frequency Airborne Radios (key system)

The Ultra High Frequency Avionics (UHF Avionics) are analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225-400 MHz frequency band, which are multi-channel transceivers, installed in an airborne military platform. These airborne devices support the tactical two-way voice communications/ coordination between the military pilot in the military aircraft and the controller on the ground.

Ultra High Frequency Ground Radios (key system)

Ultra High Frequency (UHF) Ground Radios are analog UHF amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 Mhz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and flight service station domains.

Ultra High Frequency Ground Radios - Replacement (key system)

The Ultra High Frequency Ground Radios - Replacement (UHF Ground Radios - Repl) mechanism represents analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 MHz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and Flight Service Station domains.

Very High Frequency Airborne Radios (key system)

Very High Frequency (VHF) Airborne Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 Mhz frequency band which are multi-channel transceivers installed in an airborne platform (e.g., commercial, cargo, and general aviation aircraft). These airborne devices support the tactical two-way voice communications/coordination between the pilot in the aircraft and the controller on the ground.

Very High Frequency Ground Radios (key system)

Very High Frequency (VHF) Ground Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 MHz frequency band which are single-channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the pilot in commercial, cargo, or general aviation aircraft in the oceanic, en route (i.e., ARTCC), terminal (i.e., TRACON/tower), and flight service station domains. Additionally, there are analog VHF frequency modulation (VHF - FM) radio devices operating in the 161 - 174 MHz frequency band that are multi-channel transceivers. These transceivers are used by flight inspection, aviation security, and airway facility specialists supporting local airport operations and maintenance or to perform their operational maintenance mission in support of the NAS. However, these same VHF-FM transceivers are also used to support the resolution of emergency situations or establish a level of voice command and control communications/coordination during disaster recovery.

Very High Frequency Mobile Radios (key system)

Very High Frequency (VHF) Mobile Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 Mhz frequency band which are multi-channel transceivers installed in surface vehicles (e.g., "follow-me," maintenance, administrative, and snow-removal vehicles). These devices support the tactical two-way voice communications/coordination between the operators in the vehicles and the tower controllers or airline operations personnel.

Very High Frequency Multi-Mode Airborne Radios

Very High Frequency Multi-Mode Airborne Radios (VHF MM Airborne Radios) refers to an airborne radio operating in the very high frequency (VHF) range capable of operating in the following modes: (1)) analog voice (i.e., 25 kHz spacing for use in the United States and other similarly equipped countries); (2) VHF Digital Link Mode 2 (VDL Mode-2) (two-way digital data transmission); (3) VHF Digital Link Mode 3 (VDL Mode-3), (integrated two-way digital voice/data transmission); and (4) analog voice (i.e., 8.33 kHz spacing for use in Europe and other similarly equipped countries).

Western Electric Company Model 301 Voice Switch

The Western Electric Company Model 301 Voice Switch (WECO 301) supports air-to-ground communications between air traffic controllers and pilots and ground-to-ground communications among air traffic control (ATC) personnel.

People

Ground Controller

A Ground Controller performs the following activities: Ensure separation; Control vehicles as well as aircraft on movement areas other than active runways Initiate control instructions; Monitor and operate communications equipment; Utilize tower radar display(s); Utilize alphanumerics; Assist the tower associate controller with coordination; Scan tower cab environment; Ensure computer entries and strip marking are completed for instructions or clearances issued or received; Process and forward flight plan information; Perform any functions of the tower team which will assist in meeting situation objectives; Coordinate with local control for safe and efficient use of runways and movement areas.

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Surface Vehicle Operator

Ground personnel operate vehicles on the airport surface to support aircraft service, maintenance and other operations. Ground, local, or ramp controllers may provide separation from other ground traffic (aircraft or vehicles) at controller airports. Pilots and ground personnel work together to ensure safe movement of aircraft at all airports.

Interfaces

Airport Surface Detection Equipment - Model 3 — (Surveillance Data) → Airport Movement Area Safety System

The AMASS tracks the movement of aircraft and ground vehicles detected by the ASDE-3 surface radar and provides visual and aural alerts of potential runway incursions and unsafe conditions.

Enhanced Terminal Voice Switch — (Voice Communication) → Digital Voice Recorder System

This interface records and temporarily archives voice transmissions.

Enhanced Terminal Voice Switch ← (Voice Communication) → Enhanced Terminal Voice Switch

This interface enables ATC voice communication between controllers in same or different facilities.

Enhanced Terminal Voice Switch ← (Voice Communication) → Integrated Communications Switching System Type I

This interface enables ATC voice communication between controllers in different facilities.
Enhanced Terminal Voice Switch ← (Voice Communication) → Multi-Mode Digital Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Enhanced Terminal Voice Switch ← (Voice Communication) → Rapid Deployment Voice Switch Type I
This interface enables ATC voice communication between controllers in different facilities.
Enhanced Terminal Voice Switch ← (Voice Communication) → Rapid Deployment Voice Switch Type II
This interface enables ATC voice communication between controllers in different facilities.
Enhanced Terminal Voice Switch ← (Voice Communication) → Rapid Deployment Voice Switch Type IIA
This interface enables ATC voice communication between controllers in different facilities.
Enhanced Terminal Voice Switch ← (Voice Communication) → Small Tower Voice Switch
This interface enables ATC voice communication between controllers in different facilities.
Enhanced Terminal Voice Switch ← (Voice Communication) → Ultra High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Enhanced Terminal Voice Switch ← (Voice Communication) → Ultra High Frequency Ground Radios - Replacement
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Enhanced Terminal Voice Switch ← (Voice Communication) → Very High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Flight Data Input/Output ← (Flight Data) → Flight Data Input/Output
The FDIOs in ARTCCs, TRACONs, ATCTs, and two Oceanic centers (New York and Oakland) exchange flight data with FDIOs in other ARTCCs, FDIOs TRACONs, ATCTs, and two Oceanic Centers (New York and Oakland).
Integrated Communications Switching System Type I — (Voice Communication) → Digital Voice Recorder System
This interface records and temporarily archives voice transmissions.
Integrated Communications Switching System Type I ← (Voice Communication) → Integrated Communications Switching System Type I
This interface enables ATC voice communication between controllers in same or different facilities.
Integrated Communications Switching System Type I ← (Voice Communication) → Multi-Mode Digital Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Integrated Communications Switching System Type I ← (Voice Communication) → Rapid Deployment Voice Switch Type I
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type I ← (Voice Communication) → Rapid Deployment Voice Switch Type II
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type I ← (Voice Communication) → Rapid Deployment Voice Switch Type IIA
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type I ← (Voice Communication) → Small Tower Voice Switch
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type I ← (Voice Communication) → Ultra High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Integrated Communications Switching System Type I ← (Voice Communication) → Ultra High Frequency Ground Radios - Replacement
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Integrated Communications Switching System Type I ← (Voice Communication) → Very High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Multi-Mode Digital Radios ← (Voice Communication) → Radio Control Equipment
Multi-Mode Digital Radios ← (Voice Communication) → Very High Frequency Airborne Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Multi-Mode Digital Radios ← (Voice Communication) → Very High Frequency Mobile Radios
Voice communication providing ATC coordination and direction between controllers and pilots and between controllers and ground vehicle operators.
Radio Control Equipment ← (Voice Communication) → Enhanced Terminal Voice Switch
Radio Control Equipment ← (Voice Communication) → Integrated Communications Switching System Type I
Radio Control Equipment ← (Data Communication) → Radio Control Equipment
Radio Control Equipment ← (Voice Communication) → Rapid Deployment Voice Switch Type I
Radio Control Equipment ← (Voice Communication) → Rapid Deployment Voice Switch Type II
Radio Control Equipment ← (Voice Communication) → Rapid Deployment Voice Switch Type IIA
Radio Control Equipment ← (Voice Communication) → Small Tower Voice Switch
Rapid Deployment Voice Switch Type I — (Voice Communication) → Digital Voice Recorder System
This interface records and temporarily archives voice transmissions.
Rapid Deployment Voice Switch Type I ← (Voice Communication) → Multi-Mode Digital Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Rapid Deployment Voice Switch Type I ← (Voice Communication) → Rapid Deployment Voice Switch Type I
This interface enables ATC voice communication between controllers in same or different facilities.
Rapid Deployment Voice Switch Type I ← (Voice Communication) → Rapid Deployment Voice Switch Type II
This interface enables ATC voice communication between controllers in different facilities.
Rapid Deployment Voice Switch Type I ← (Voice Communication) → Rapid Deployment Voice Switch Type IIA
This interface enables ATC voice communication between controllers in different facilities.
Rapid Deployment Voice Switch Type I ← (Voice Communication) → Small Tower Voice Switch
This interface enables ATC voice communication between controllers in different facilities.
Rapid Deployment Voice Switch Type I ← (Voice Communication) → Ultra High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Rapid Deployment Voice Switch Type I ← (Voice Communication) → Ultra High Frequency Ground Radios - Replacement
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Rapid Deployment Voice Switch Type I ← (Voice Communication) → Very High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Rapid Deployment Voice Switch Type II — (Voice Communication) → Digital Voice Recorder System
This interface records and temporarily archives voice transmissions.

Rapid Deployment Voice Switch Type II ⇐ (Voice Communication) ➔ Multi-Mode Digital Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Rapid Deployment Voice Switch Type II ⇐ (Voice Communication) ➔ Rapid Deployment Voice Switch Type II
This interface enables ATC voice communication between controllers in same or different facilities.
Rapid Deployment Voice Switch Type II ⇐ (Voice Communication) ➔ Rapid Deployment Voice Switch Type IIA
This interface enables ATC voice communication between controllers in different facilities.
Rapid Deployment Voice Switch Type II ⇐ (Voice Communication) ➔ Small Tower Voice Switch
This interface enables ATC voice communication between controllers in different facilities.
Rapid Deployment Voice Switch Type II ⇐ (Voice Communication) ➔ Ultra High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Rapid Deployment Voice Switch Type II ⇐ (Voice Communication) ➔ Ultra High Frequency Ground Radios - Replacement
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Rapid Deployment Voice Switch Type II ⇐ (Voice Communication) ➔ Very High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Rapid Deployment Voice Switch Type IIA — (Voice Communication) ➔ Digital Voice Recorder System
This interface records and temporarily archives voice transmissions.
Rapid Deployment Voice Switch Type IIA ⇐ (Voice Communication) ➔ Multi-Mode Digital Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Rapid Deployment Voice Switch Type IIA ⇐ (Voice Communication) ➔ Rapid Deployment Voice Switch Type IIA
This interface enables ATC voice communication between controllers in same or different facilities.
Rapid Deployment Voice Switch Type IIA ⇐ (Voice Communication) ➔ Small Tower Voice Switch
This interface enables ATC voice communication between controllers in different facilities.
Rapid Deployment Voice Switch Type IIA ⇐ (Voice Communication) ➔ Ultra High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Rapid Deployment Voice Switch Type IIA ⇐ (Voice Communication) ➔ Ultra High Frequency Ground Radios - Replacement
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Rapid Deployment Voice Switch Type IIA ⇐ (Voice Communication) ➔ Very High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Small Tower Voice Switch — (Voice Communication) ➔ Digital Voice Recorder System
This interface records and temporarily archives voice transmissions.
Small Tower Voice Switch ⇐ (Voice Communication) ➔ Multi-Mode Digital Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Small Tower Voice Switch ⇐ (Voice Communication) ➔ Small Tower Voice Switch
This interface enables ATC voice communication between controllers in same or different facilities.
Small Tower Voice Switch ⇐ (Voice Communication) ➔ Ultra High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Small Tower Voice Switch ⇐ (Voice Communication) ➔ Ultra High Frequency Ground Radios - Replacement
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Small Tower Voice Switch ⇐ (Voice Communication) ➔ Very High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Ultra High Frequency Ground Radios ⇐ (Voice Communication) ➔ Ultra High Frequency Airborne Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Ultra High Frequency Ground Radios - Replacement ⇐ (Voice Communication) ➔ Ultra High Frequency Airborne Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Very High Frequency Ground Radios ⇐ (Voice Communication) ➔ Very High Frequency Airborne Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Very High Frequency Ground Radios ⇐ (Voice Communication) ➔ Very High Frequency Mobile Radios
Voice communication providing ATC coordination and direction between controllers and pilots and between controllers and ground vehicle operators.

Issues

none identified

Service Group Air Traffic Services
Service ATC-Separation Assurance
Capability Surface Separation Capability
Operational Improvement

Improve Pilot Separation Assurance Functions on the Surface by Providing Targets for On-Board Displays (102408)

Automated systems provide pilots the target definition and information previously provided to controllers. Both pilots and controllers viewing high-definition target location, identification, and speed greatly enhance situational awareness for all parties. The increase in and fidelity of information provided to pilots enhance and enrich the operational moving environment of the airport surface. Automated systems display and advise the pilot of the location of vehicles and other aircraft. Automated broadcast of aircraft and vehicle position to ground sensors/receivers provides a comprehensive digital display of the runway and taxi environment. Decision support system algorithms enhance target displays, and the displays support identifying and alerting pilots that may enter into a runway incursion environment. Civil as well as commercial users utilize multifunction flight deck displays to enhance traffic situational awareness of all current traffic at the airport. Air Traffic provides air traffic management services to aircraft equipped with capability to simulate visual meteorological conditions.
30-Jun-2015 to 30-Jun-2024

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Automated systems provide pilots target definition and information previously provided to controllers through ground based transceivers (GBT), Surveillance Data Node (SDN), Surveillance Data Processor, Next Generation Air/Ground Communications). Both pilots and controllers view high-definition target location, identification, and speed to greatly enhance their situational awareness. Delivery of more information with increased fidelity to pilots enhances and enriches the operational moving environment of the airport surface. Automated systems will display and advise the pilot of the location of vehicles and other aircraft. Automated broadcast (Automatic Dependent Surveillance - Broadcast) of aircraft and multilateration of the vehicle-transmitted beacon position to ground sensors/receivers (GBTs, SDN, Flight Object Management System) provide comprehensive digital depiction of the runway and taxi environment. This information coupled with moving maps of the airport provide the pilot enhanced situational awareness. Target displays enhanced with decision support system algorithms support identification and alerting to pilots that may enter into a runway incursion environment. Both civil and commercial users employ multifunction flight deck displays to enhance traffic situational awareness of all current traffic at the airport (Standard Automation Platform Workstation). Air traffic controllers will provide air traffic management services to aircraft equipped with visual meteorological condition-like capability.

Benefits

There is common situational awareness for the service provider and the pilot. Providing targets on the onboard display allows pilots to better manage their assigned separation function in executing taxi-clearances. By better understanding the surrounding traffic and runway and taxi environment, the pilot can execute clearance safely and efficiently in planning aircrafts movements to meet crossing and merging requirements along taxiways. The larger picture allows the pilot to spool up engines just in time by anticipating controller clearance delivery.

Providing the full air-ground picture to the pilot increases safety. Potential controller clearance errors can be mitigated because the pilots can see the consequence more clearly. This increases the pilots effectiveness as the second set of eyes.

Systems

Automatic Dependent Surveillance - Broadcast Avionics

Automatic Dependent Surveillance-Broadcast Avionics (ADS-B Avionics) transmits and receives Global Positioning System (GPS)-derived aircraft 4-dimensional position data, aircraft identification, aircraft velocity, and other selected aircraft data. Augmented GPS data may be required for certain applications. This is intended to be a surveillance system and not an avoidance system. The broadcast of own position is automatic and is intended to provide surveillance information to other users. The aircraft or vehicle originating the broadcast may not have knowledge of which users are receiving its broadcast. The ADS-B avionics are designed to transmit this 4-dimensional position data of own aircraft or vehicle and to also receive same type of information from others that are similarly equipped to receive and process ADS-B surveillance information.

BSGS Broadcast Services Ground Station (key system)

The BSGS (Broadcast Services Ground Station) supports Air-Ground broadcast services. This includes the reception of ADS-B from equipped aircraft/vehicles and the transmission of Traffic Information Service-Broadcast (TIS-B) and Flight Information Service-Broadcast (FIS-B) for use by equipped aircraft. Generally, the BSGS will interface via the SDN to provide ADS-B information to ATC automation and receive TIS-B and FIS-B information from TIS-B and FIS-B servers. The BSGS includes antenna(s), one or more dual link (i.e., 1090 MHz Extended Squitter-1090ES and Universal Access Transceiver-UAT) Ground Based Transceiver(s)(GBT), processing functions and communications functions. Several configurations of the BSGS are required to support variations in the geographic service volume and functions to be supported at specific categories of operational sites. BSGSs will be installed at 448 airports and 100 en route locations. Included are those airports equipped with Secondary Surveillance Radar (SSR) and about 140 additional towered airports (currently without SSR). The BSGS will support ADS-B and TIS-B services via both the 1090ES link and by the UAT link. The BSGS will also support FIS-B via the UAT link. BSGSs incorporate a multilink gateway function that provides ADS-B rebroadcasts via the ADS-B alternate link. A BSGS incorporating 2 GBTs are required for airport surface and terminal surveillance coverage at each of 268 smaller airports, a BSGS incorporating 3 GBTs (on average) are required at 120 of the mid-sized airports, and a BSGS incorporating 6 GBTs (on average) are required at the 60 largest airport (those equipped with ASDE-X or ASDE-3 surface surveillance systems).

The following BSGS functions are required to support the various categories of NAS BSGS sites, except as noted below: (1) 1090ES and UAT receive/transmit (i.e., the GBT funnction); (2) multi-link gateway function; (3) process received ADS-B messages and output (via the SDN) ADS-B reports for use by ATC automation; (4) accept TIS-B and FIS-B information from ground TIS-B/FIS-B servers and manage the generation and broadcast of link specific TIS-B messages via the 1090ES and UAT links and FIS-B messages via the UAT link.

The following BSGS configurations are assumed based on the category of the operational site. Except as noted below all BSGS configuration support the above described functions.

En route (100 sites): (1) One multi-sector antenna with each sector connected to the individual 1090ES and UAT receivers. Supports up to 250 nmi. ADS-B reception. En route locations that are intended to provide only low-altitude gap filler coverage do not require the long-range capability. (2) One omni-directional transmit antenna. Transmitter power sized to support the required TIS-B and FIS-B coverage for that specific site.

Terminal/Airport without ASDE-X (415 airports incl. 27 ASDE-3 equipped airports) with each site having: (1) BSGS with at least 2 GBTs with omni-directional antennas sited for both airport surface and terminal airspace coverage; (2) additional GBTs as needed to provide coverage of the primary airport surface movement area.

Terminal/Airport with ASDE-X (26 ASDE-X plus 7 upgraded ASDE-3 airports with an average of 6 GBTs per BSGS): (1) ASDE-X ground stations upgraded to support GBT functionality; (2) At least two of the GBTs provide ADS-B coverage to the edge of the terminal airspace and the TIS-B coverage; (3) ASDE provides the surveillance data source to support TIS-B for surface traffic.

Communications Management System (key system)

The CMS Management and Control function performs tasks for overall management and control of all air/ground and ground/ground voice and data communications to support System Wide Information Management (SWIM). CMS will also incorporate a reconfiguration control function to support reconfigurable airspace assignments, data routing, and a digital recording for both voice and data.

The En Route Automation Modernization program has assumed the data recording function via the Standard Automation Platform, and the Digital Voice Recorder System performs the voice recording function. The CMS routing function is a data router that ensures transport of data communications among Air Traffic Control facilities and users of SWIM. Additionally, CMS integrates functionalities inherently provided by the voice switches, the voice recorders, and the ATN Router.

Digital Voice Recorder System Replacement

The Digital Voice Recorder System Replacement (DVRS Replacement) is a modern digital system used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

Enhanced Terminal Voice Switch

The Enhanced Terminal Voice Switches (ETVS) are installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) facilities with more than four air traffic controller positions. The ETVS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The ETVS (installed in the ATCT) provides the ATC operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the ETVS.

The ETVS (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within a TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the ETVS.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate ETVS systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Flexible Voice Switch (key system)

Voice communications is the primary means of communications among ATC facilities and between an Air Traffic Control Specialist (ATCS) and a pilot. Voice switching provides the ATCS both G/G Interfacility/Intrafacility and A/G voice communications connectivity. The NAS Voice Switch (NVS) program will replace aging voice switches and their analog interfaces with modern digital voice switches consisting of digital interfaces. The Flexible Voice Switch will be the common platform and baseline voice switch for all NAS domains with modularity and scalability to meet communications connectivity requirements. Additionally, this switch will be expandable to accommodate growth capacity requirements and able to support NAS Modernization needs as described in various Operational Improvements.

Flight Object Management System - Terminal (key system)

The FOMS is a component of the Standard Automation Platform (SAP). The FOMS processes flight data received from multiple sources via the System Wide Information Management (SWIM) Management Unit. The FOMS also receives track data from the Surveillance Data Processor (SDP) and associates tracks with flight data, producing the flight object, which is published to SWIM for subscriber use. Flight plan support functionality includes end-to-end profile evaluation in all phases of flight and evaluation against static and dynamic constraints (terrain, obstacles, airspace restrictions, etc.). The FOMS supports flight planning up to 180 days prior to day of flight. A user can access the flight object from initial to closeout in the same manner. The FOMS provides end-to-end flight data management from preflight to post analysis. Ownership of the flight object begins and ends with Traffic Flow Management and transitions during the flight to clearance delivery, ramp, surface, departure, transition to cruise, cruise, transition to arrival, and ramp. Flight data management is based on trajectory, assigned volumes, and "necessary" route structure.

Next Generation Traffic Flow Management (key system)

The Next Generation Traffic Flow Management (NG-TFM) system provides an array of automation and data processing tools for Traffic Management Specialists (TMS) and Traffic Management Coordinators (TMC), as well as a gateway that enables NAS users to make changes in flight schedules based on planned traffic initiatives (e.g., Ground Delay Programs) and other NAS data. This enhanced decision support system provides increased information exchange between FAA service providers and NAS users. NG-TFM receives flight schedules from NAS users (e.g., air carriers) and combines these with weather data, NAS status data, and planned traffic initiatives to generate detailed graphical and textual traffic displays as far as 24 hours into the future on both national and local scales. Features include both pre-flight and post-flight analysis tools, flight data archiving, enhanced traffic displays, traffic strategy (one or more initiatives) automation, "what if" strategy analysis, and automated TFM training tools.

NG-TFM is comprised of five different software component systems and will include a hardware and operating system software tech refresh. The complete NG-TFM software package includes changes to support interfaces with the Flight Object Management System (FOMS) and System Wide Information Management (SWIM). When complete, this will establish a new NG-TFM system baseline.

Radio Control Equipment

Radio Control Equipment (RCE), located at both ATC facilities and remote communication sites, control the operation of remotely located ground to air Very High Frequency/Ultra High Frequency (VHF/UHF) radios used by air traffic controllers to communicate with pilots. RCE interfaces with the voice switch at the ATC facility, telephone landlines, and ground to air radios at the En Route Remote Communications Air/Ground (RCAG) sites, Terminal Remote Transmitter/Receiver (RTR) sites, and Flight Service Station Remote Communications Outlet (RCO) sites.

Satellite Communication Ground Radios

Satellite Communications (SATCOM) Ground Radios are transceivers installed at oceanic and en route facilities to support an alternative means of tactical air traffic control (ATC) voice communications between ground controllers and pilots in aircraft. These transceivers are typically used in transoceanic applications. These transceivers are also installed at regional facilities and used as an alternate means of communications in case of total ground communications failure or between locations in mountainous terrain or where other means of communications are not possible (e.g., Alaska).

Oceanic air to ground satellite communications are provided via a communications service provider. The FAA currently has no plans to develop or implement its own air to ground SATCOM ground radios.

Standard Automation Platform Convergence Phase 1 (key system)

The purpose of Standard Automation Platform Convergence Phase 1 (SAP Conv P1) is to reduce both procurement and recurring costs by standardizing and sharing as many hardware and software ATC Automation components as possible.

An engineering convergence task will begin in fiscal year 2005 and run through 2015. All components from each of the automation systems (STARS, ERAM, TFM, etc.) will be analyzed, and the "best of breed" and "core" components will be selected. SAP convergence will be performed in the following areas: (1) Hardware; (2) System Software (operating systems, Commercial-Off-The-Shelf tools, etc.); (3) ATC applications that can be shared across domains; (4) ATC applications that are unique to a domain; and (5) ATC system support tools that can be shared across domains (adaptation, data extraction or systems analysis recording, data reduction and analysis tools, etc.). Proven STARS and ERAM components will be slected, integrated into the SAP, and rigorously tested for replacing STARS and ERAM components at or near their end of service life.

Prototyping begun under Phase 1 will continue with SAP Conv P2. The results of both efforts will lead to refining the requirements to develop the SAP WS mechanism with SDP and FOMS applications.

Standard Automation Platform Convergence Phase 2

Standard Automation Platform Convergence Phase 2 (SAP Conv P2) continues with prototyping started under Phase 1 to insure that recurring and technical refresh costs for ATC automation elements are minimized by using as many common components as prossible.

SAP Phase 2 incorporates upgrades and technical refreshes of ATC applications, systems software, and hardware to ensure use of common elements across the terminal, enroute, oceanic, command center, and airport surface ATC Automation domains.

Prototyping will conclude with Phase 2, and the results will lead to refining the requirements for development of the SAP WS mechanism with SDP and FOMS applications.

Standard Automation Platform Remote Workstation Phase 1 (key system)

The SAP RW provides the controller in the tower and the specialist in Flight Advisory Services an interface to the Flight Object Management System and Surveillance Data Processor. The workstation additionally provides the tower controller a display of arrival/departure surveillance data.

Standard Automation Platform Remote Workstation Phase 2

Provides Technical Refresh of SAP Remote Workstation Phase 1. The SAP RW provides the controller in the tower and the specialist in Flight Advisory Services an interface to the Flight Object Management System and Surveillance Data Processor. The workstation additionally provides the tower controller a display of arrival/departure surveillance data.

Standard Automation Platform Workstation Phase 1 (key system)

The SAP consists of the Flight Object Management System (FOMS), the Surveillance Data Processor (SDP), and the SAP Workstation. The SAP will be installed in En Route and Arrival/Departure facilities. The SDP performs surveillance data processing and tracking on Surveillance Data Objects received from the Surveillance Data Network. The FOMS performs flight plan processing, associates flight and track data, and publishes the Flight Object on the System Wide Information Management network. The SAP workstation provides the controller interface for the FOMS and SDP.

Surface Traffic Information Processor

The STIP would be an extension of the Automatic Dependent Surveillance-Broadcast (ADS-B)/Traffic Information Service - Broadcast (TIS-B) capability at 60 large airports equipped with Airport Surface Detection Equipment (ASDE) Model X or Model 3 systems. A processor would be added at each of these airports to support Traffic Information Service-Broadcast (TIS-B) services for surface and nearby low-altitude traffic. The STIP will receive surveillance information from the ASDE-X or ASDE-3 system and generate TIS-B messages for delivery by the Broadcast Services Ground Stations (BSGSs) providing surface coverage at that airport. The STIP will support of subset of the functionality of the TIS-FIS Broadcast Server (that is intended to support TIS-B for airborne users), but the STIP will support a more real-time TIS-B service with a higher update rates and lower latency consistent with the available surface surveillance data source and the needs to support surface movement operations.

Surveillance Data Network (key system)

National Airspace System (NAS) surveillance systems, including radar and automatic dependent surveillance systems will provide surveillance data objects via the Surveillance Data Network (SDN), which is a sub-network of the System Wide Information Management (SWIM) and the FAA Telecommunication Infrastructure (FTI). The published Surveillance Data Objects (SDO) will be made available to NAS and other users, including the Transportation Security Administration, Department of Defense, and others. Surveillance data availability supports 3-mile separation standards, gate-to-gate traffic management, seamless airspace, and dynamic resectorization. Improved surveillance information is provided in a timely and consistent manner seamlessly across the NAS for operations, planning, and decision making. The information will be available to all users and service providers via SDO in near real time. This information enables decisions to be based on a shared common view of situations, even as conditions are changing. Improved surveillance with SDOs will provide the automation higher quality of data for seamless surveillance and, in combination with other capabilities and new procedures, enable capacity and safety improvements. These benefits accrue from increased situation awareness by decision makers and improved operation of decision support and analysis tools that use surveillance information.

Surveillance Data Processor (key system)

SDP is a component of SAP and operates in En Route and Terminal. The SDP will make improvements to sensors and automation systems that will allow for expanded use of 3-mile separation and terminal procedures. The operational improvements enable more efficient control of aircraft and use of airspace. To accomplish this, all 1030/1090 Beacon interrogators will be upgraded to disseminate their existing 1.2 milli-radian azimuth accuracy and other information, such as time of measurement, confidence, quality, and so on. The automation system algorithms will be improved or new algorithms will be developed to exploit the additional information content of the improved surveillance reports. The method of presentation (display) to support 3-mile separation will be developed and tested to ensure safety. The existing long-range sensor surveillance update period is (12 seconds) and is insufficient to support 3-mile separation. In areas where only long-range sensors exist and where the Air Traffic Service requires 3-mile separation, these sensors may be modified to double the update rate to achieve 3-mile separation.

Ultra High Frequency Ground Radios - Replacement

The Ultra High Frequency Ground Radios - Replacement (UHF Ground Radios - Repl) mechanism represents analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 MHz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and Flight Service Station domains.

Very High Frequency Ground Radios

Very High Frequency (VHF) Ground Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 MHz frequency band which are single-channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the pilot in commercial, cargo, or general aviation aircraft in the oceanic, en route (i.e., ARTCC), terminal (i.e., TRACON/tower), and flight service station domains. Additionally, there are analog VHF frequency modulation (VHF - FM) radio devices operating in the 161 - 174 MHz frequency band that are multi-channel transceivers. These transceivers are used by flight inspection, aviation security, and airway facility specialists supporting local airport operations and maintenance or to perform their operational maintenance mission in support of the NAS. However, these same VHF-FM transceivers are also used to support the resolution of emergency situations or establish a level of voice command and control communications/coordination during disaster recovery.

Very High Frequency Mobile Radios

Very High Frequency (VHF) Mobile Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 Mhz frequency band which are multi-channel transceivers installed in surface vehicles (e.g., "follow-me," maintenance, administrative, and snow-removal vehicles). These devices support the tactical two-way voice communications/coordination between the operators in the vehicles and the tower controllers or airline operations personnel.

Very High Frequency Multi-Mode Airborne Radios

Very High Frequency Multi-Mode Airborne Radios (VHF MM Airborne Radios) refers to an airborne radio operating in the very high frequency (VHF) range capable of operating in the following modes: (1)) analog voice (i.e., 25 kHz spacing for use in the United States and other similarly equipped countries); (2) VHF Digital Link Mode 2 (VDL Mode-2) (two-way digital data transmission); (3) VHF Digital Link Mode 3 (VDL Mode-3), (integrated two-way digital voice/data transmission); and (4) analog voice (i.e., 8.33 kHz spacing for use in Europe and other similarly equipped countries).

Support Activities

FAA Adaptation for Improving Pilot Separation Assurance Functions On The Surface By Providing Targets For On-Board Displays

Many NAS systems incorporate parameters that are adjustable. This allows for the setting of system parameters to optimize performance at each particular site. When new systems that have adjustable parameters are introduced into the NAS, adaptation data must be developed for the system. Environmental and procedural changes may also result in the need to modify FAA Adaptation Data. Generally, adaptation will begin 12 months before IOC and continue until 12 months after IOC.

FAA Airspace Design for Improving Pilot Separation Assurance Functions On The Surface By Providing Targets For On-Board Displays

FAA Airspace Design provides the aviation community the description, operational composition, and status of airspace/airport components of the NAS. Generally, airspace design begins six months prior to Initial Operating Capability.

FAA Certification for Improving Pilot Separation Assurance Functions On The Surface By Providing Targets For On-Board Displays

FAA certification is an activity necessary to support people and systems in the delivery of NAS services. Avionics and associated systems are deemed to be critical to the safety of flight and must be certificated. In addition certain operators and service providers require to be certified such as pilots, dispatchers and others. Certification will generally begin 24 months prior to Initial Operating Capability, and be complete prior to receiving or giving service.

FAA Rulemaking for Improving Pilot Separation Assurance Functions On The Surface By Providing Targets For On-Board Displays

FAA Rulemaking is necessary when Federal Air Regulations require or change the delivery of NAS services. The regulatory process must be complete prior to implement or service provision. The lead time for change vary greatly due to the varieties of scope but will take a minimum of 180 days before implemented.

FAA Spectrum Engineering for Improving Pilot Separation Assurance Functions On The Surface By Providing Targets For On-Board Displays

FAA Spectrum Engineering ensures that radio frequency spectrum is available before developing or procuring new communications-electronics systems.

FAA Standards for Improving Pilot Separation Assurance Functions On The Surface By Providing Targets For On-Board Displays

FAA standards development is an activity necessary to support people and systems in the delivery of NAS services. FAA Standards establish rules for the measure of quantity, weight, extent, value, or quality.

Non-FAA Certification for Improving Pilot Separation Assurance Functions On The Surface By Providing Targets For On-Board Displays

FAA standards are applied to user activities necessary to support people and systems in the delivery of NAS services. Aviation avionics and equipment is deemed to be critical to the safety of flight and must be certificated. It is also necessary to certify aviation personnel compliance with these standards. Certification will generally begin 24 months prior to Initial Operating Capability, and be complete prior to receiving service.

Non-FAA Pilot Procedure Development for Improving Pilot Separation Assurance Functions On The Surface By Providing Targets For On-Board Displays

A number of NAS users document the way their activities are to be carried out. The introduction of new systems, or changes to existing systems may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development will generally begin once ATC procedures have been established and be complete by 90 days prior to Initial Operating Capability, in order to facilitate training.

Non-FAA Pilot Training for Improving Pilot Separation Assurance Functions On The Surface By Providing Targets For On-Board Displays

Non-FAA Pilot Training is provided to educate pilots as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional pilot training. Training will generally begin 60 days prior to IOC and be complete within one year following Full Operating Capability.

Non-FAA Procedure Development for Improving Pilot Separation Assurance Functions On The Surface By Providing Targets For On-Board Displays

A number of NAS users document the way their activities are to be carried out. The introduction of new systems, or changes to existing systems may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development will generally begin once ATC procedures have been established and be complete by 90 days prior to Initial Operating Capability, in order to facilitate training.

People

Ground Controller

A Ground Controller performs the following activities: Ensure separation; Control vehicles as well as aircraft on movement areas other than active runways Initiate control instructions; Monitor and operate communications equipment; Utilize tower radar display(s); Utilize alphanumerics; Assist the tower associate controller with coordination; Scan tower cab environment; Ensure computer entries and strip marking are completed for instructions or clearances issued or received; Process and forward flight plan information; Perform any functions of the tower team which will assist in meeting situation objectives; Coordinate with local control for safe and efficient use of runways and movement areas.

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Surface Vehicle Operator

Ground personnel operate vehicles on the airport surface to support aircraft service, maintenance and other operations. Ground, local, or ramp controllers may provide separation from other ground traffic (aircraft or vehicles) at controller airports. Pilots and ground personnel work together to ensure safe movement of aircraft at all airports.

Interfaces

Communications Management System ← (Data Communication) → Communications Management System

Controllers in the same or different facilities communicate via CMS.

Communications Management System ← (Voice Communication) → Communications Management System

Controllers in the same or different facilities communicate via CMS.

Flight Object Management System - Terminal — (Flight Data) → BSGS Broadcast Services Ground Station

FOMS sends flight data to the GBT for broadcast to aircraft.

Flight Object Management System - Terminal ← (Flight Data) → Next Generation Traffic Flow Management

FOMS and NG-TFM exchange flight data.

Flight Object Management System - Terminal ← (Flight Data) → Standard Automation Platform Remote Workstation Phase 1

FOMS exchanges flight plan data with the SAP RW.

Flight Object Management System - Terminal — (Flight Data) → Standard Automation Platform Workstation Phase 1

FOMS provides the flight object to the SAP WS for display to the controller.

Next Generation Traffic Flow Management — (NAS Status Data) → Communications Management System

NG-TFM determines the best use of NAS resources and directs CMS to reconfigure communication resources accordingly.

Surveillance Data Processor — (Surveillance Data) → BSGS Broadcast Services Ground Station

The SDP provides surveillance data for aircraft that are not responding to beacon interrogations or providing ADS-B reports to the GBT for transmission up both the UAT and 1090 links.

Surveillance Data Processor — (Track Data) → Flight Object Management System - Terminal

SDP sends correlated surveillance data to FOMS for further processing, including association with flight data.

Surveillance Data Processor — (Track Data) → Standard Automation Platform Remote Workstation Phase 1

The SDP provides track data to the SAP RW for display to tower controllers.

Surveillance Data Processor — (Surveillance Data) → Standard Automation Platform Workstation Phase 1

The SDP sends surveillance data to the SAP WS for display to the controller.

Issues

Need sufficient equipage of ADS-Bwith CDTI or CDTI and TIS-B. Need clear concept of use for CDTI and ADS-B/TIS-

Service Group Air Traffic Services

Service ATC-Separation Assurance

Capability Surface Separation Capability

Operational Improvement

Provide Enhanced Aircraft Target Data to Service Providers for Surface Movement and Runway Separation (102406)

Smaller general aviation aircraft, as well as commercial aircraft, are identified and tracked on the runway surface to provide a full, comprehensive picture of the surface environment to the controller. Automated systems display and advise the controller of the location of vehicles and aircraft. Automated broadcast of aircraft and vehicle position to ground sensors/receivers provides a comprehensive digital display of the runway and taxi environment. This complements visual observation when poor visibility or distance impairs the controllers surveillance of the airport surface. Decision support system algorithms enhance target displays, and the displays support identifying and alerting aircraft and vehicles that may enter into a runway incursion environment. Target displays and decision support systems provide high-fidelity runway incursion alerts to controllers.

30-Jun-2015 to 30-Jun-2024

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Movement and Runway Separation

Controllers identify and track aircraft on the runway surface to get a fuller, more comprehensive picture of the surface environment using a combination of radar and multilateration of transponder returns. Interfaces with other Air Traffic Control, including the Automated Radar Terminal System and the Standard Terminal Automation Replacement System automation systems, provide arrival aircraft data tags, including position, aircraft identification, and predicted runway information. Delivery of more information and increased fidelity of the information to tower controllers enhance and enrich the operational moving environment of the airport surface. Providing comprehensive data tags of aircraft and enhanced returns of vehicle position to ground sensors/receivers provide comprehensive digital depiction/detection of the airport surface (runway and taxi environment) to complement visual observation when visibility or distance impairs the controller□s surveillance of the airport surface. Airport surface detection equipment provides a consolidated presentation of primary radar subsystems, multilateration subsystems, and data fusion subsystems, to present a formulated, high definition of the surface environment (Airport Surface Detection Equipment (ASDE)-3/Airport Movement Area Safety System and ASDE-X). Airport surface detection equipment identifies and track targets, project target paths, and alert controllers to possible conflicts. Target displays will be enhanced with decision support system (DSS) algorithms, which will support identification and alerting of aircraft and vehicles that may enter into a runway incursion environment. Target displays and the DSS will provide high-fidelity runway incursion alerts to controllers.

Benefits

Providing digital vehicle and aircraft targets with alerting logic and flashing tags for aircraft improves the service provider's ability to respond to potential incursions with greater efficiency and reduced workload.

Systems

Airport Movement Area Safety System

The Airport Movement Area Safety System (AMASS) with Airport Surface Detection Equipment (ASDE) provides controllers with automatically generated visual and aural alerts of potential runway incursions and other potential unsafe conditions. AMASS includes the Terminal Automation Interface Unit (TAIU) that processes arrival data from the airport surveillance radar. AMASS adds an automation enhancement to the ASDE-3 and tracks the movement of aircraft and ground vehicles on the airport surface and presents the data to the tower controllers via the ASDE display.

Airport Surface Detection Equipment - Model 3

Airport Surface Detection Equipment - Model 3 (ASDE-3) provides primary radar surveillance of aircraft and airport service vehicles on the surface movement area. ASDE-3 is installed at the busiest U.S. airports. Radar monitoring of airport surface operations (ground movements of aircraft and other supporting vehicles) provides an effective means of directing and moving surface traffic. This is especially important during periods of low visibility such as rain, fog, and night operations.

The ASDE-3 will undergo a SLEP to extend its service life through 2015 (see ASDE-3 SLEP), which will enable it to more effectively support AMASS (see) through this same time period.

Airport Surface Detection Equipment Model X (key system)

The Airport Surface Detection Equipment Model X (ASDE-X) consists of a primary radar subsystem, multilateration subsystem, data fusion subsystem, and a display. ASDE-X will detect, identify and track targets; project target paths, and alert controllers to possible conflicts. Interfaces with other Air Traffic Control (ATC) automation systems will provide arrival aircraft data tag including position, and aircraft identification, and predicted runway information.

Digital Bright Radar Indicator Tower Equipment

The Digital Bright Radar Indicator Tower Equipment (DBRITE) is a tower display system that provides a raster scan presentation of radar/beacon videos and automation system alphanumeric data. The system accepts radar, beacon, external map, analog data, and automation system data.

Digital Voice Recorder System

Provides modern digital voice recording devices used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

In Feburary 2004, the DVRS was upgraded with a 24-channel card, which replaced the 16-channel card. This minor upgrade, called DVR II, was not extended to the systems installed prior to February 2004.

Digital Voice Recorder System Replacement

The Digital Voice Recorder System Replacement (DVRS Replacement) is a modern digital system used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

Emergency Voice Communications System

The Emergency Voice Communications System (EVCS) is located at Headquarters (HQ), Regional Offices, several Air Route Traffic Control Centers (ARTCCs), Terminal Radar Approach Control (TRACON) facilities, and other selected sites. EVCS uses two (2) dedicated Federal Telecommunications Service 2001 (FTS2001) dial access channels at most FAA locations. Dedicated dial lines using the Public Switched Telephone Network (PSTN) are used at locations not having direct access to FTS2001. Supports HQ and Regional Communications Command Centers'' functions for accident and incident reports, hijacks, aircraft crashes, aviation security matters, military activities, natural disasters, etc.

Enhanced Terminal Voice Switch

The Enhanced Terminal Voice Switches (ETVS) are installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) facilities with more than four air traffic controller positions. The ETVS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The ETVS (installed in the ATCT) provides the ATC operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the ETVS.

The ETVS (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within a TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the ETVS.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate ETVS systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Flexible Voice Switch (key system)

Voice communications is the primary means of communications among ATC facilities and between an Air Traffic Control Specialist (ATCS) and a pilot. Voice switching provides the ATCS both G/G Interfacility/Intrafacility and A/G voice communications connectivity. The NAS Voice Switch (NVS) program will replace aging voice switches and their analog interfaces with modern digital voice switches consisting of digital interfaces. The Flexible Voice Switch will be the common platform and baseline voice switch for all NAS domains with modularity and scalability to meet communications connectivity requirements. Additionally, this switch will be expandable to accommodate growth capacity requirements and able to support NAS Modernization needs as described in various Operational Improvements.

Flight Data Input/Output

The Flight Data Input/Output (FDIO) system provides flight progress information for use by the Tower, Terminal Radar Approach Control (TRACON) and Air Route Traffic Control Center (ARTCC) controllers. The FDIO system allows Air Traffic Control (ATC) Specialists to input automated flight data, perform data manipulation, and print flight strips.

Full Digital Automated Radar Terminal System Display

Full Digital ARTS Display (FDAD) is the fully digital ARTS display system that provides the display and data input devices for terminal controllers using ARTS IIIE and ARTS IIIA. The FDAD can work in analog video time share mode or full digital mode. The present application is analog video time share mode.

Integrated Communications Switching System Type I

The Integrated Communications Switching System Type I (ICSS I) are installed at Airport Traffic Control Towers (ATCT), Terminal Radar Approach Control (TRACON) facilities, and Automated Flight Service Stations (AFSS).

The ICSS I (installed in the ATCT) provides the air traffic control (ATC) operational ground-ground voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/air traffic control system command center (ATCSCC) specialists. Ground-air radio connectivity between ATCT controllers and pilots is also supported by the ICSS I.

The ICSS I (installed in the TRACON) provides the ATC operational ground-ground voice communications interconnectivity between controllers within TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Ground-air radio connectivity between TRACON controllers and pilots is also supported by the ICSS I.

The ICSS I (installed in the AFSS) provides the ATC operational ground-ground voice communications interconnectivity between specialists within an AFSS (intercom), interconnectivity between specialists in separate AFSSs (interphone), and interconnectivity between Flight Service Station (FSS) specialists and Air Route Traffic Control Center (ARTCC) controllers/TRACON controllers/ATCT controllers/Air Traffic Control System Command Center (ATCSCC) specialists. Ground-air radio connectivity between AFSS specialists and pilots is also supported by the ICSS I.

Integrated Communications Switching System Type II

The Integrated Communications Switching System Type II (ICSS II) are installed at Airport Traffic Control Towers (ATCT), Automated Flight Service Stations(AFSS), and Terminal Radar Approach Control (TRACON) facilities.

The ICSS II (installed in the ATCT) provides the air traffic control (ATC) operational ground-ground voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Ground-air radio connectivity between ATCT controllers and pilots is also supported by the ICSS II.

The ICSS II (installed in the TRACON) provides the ATC operational ground-ground voice communications interconnectivity between controllers within TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC)) controllers/ Flight Service Station (FSS) specialists/air traffic control system command center (ATCSCC) specialists. Ground-air radio connectivity between TRACON controllers and pilots is also supported by the ICSS II.

Radar Automated Display System

The Radar Automated Display System (RADS) is the Air Traffic Controller workstation for the Automated Radar Terminal System Model IIE (ARTS IIE).

Radio Control Equipment

Radio Control Equipment (RCE), located at both ATC facilities and remote communication sites, control the operation of remotely located ground to air Very High Frequency/Ultra High Frequency (VHF/UHF) radios used by air traffic controllers to communicate with pilots. RCE interfaces with the voice switch at the ATC facility, telephone landlines, and ground to air radios at the En Route Remote Communications Air/Ground (RCAG) sites, Terminal Remote Transmitter/Receiver (RTR) sites, and Flight Service Station Remote Communications Outlet (RCO) sites.

Rapid Deployment Voice Switch Type I

The Rapid Deployment Voice Switch Type I (RDVS I) is installed at Airport Traffic Control Towers (ATCT) and Terminal

Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS I (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the RDVS I. The RDVS I (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the RDVS I.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS I systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Rapid Deployment Voice Switch Type II

The Rapid Deployment Voice Switch Type II (RDVS II) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS II (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the RDVS II. The RDVS II (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the RDVS II.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS II systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Rapid Deployment Voice Switch Type IIA

The Rapid Deployment Voice Switch Type IIA (RDVS IIA) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS IIA (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. The RDVS IIA also supports air-to-ground (A/G) radio connectivity between ATCT controllers and pilots. The RDVS IIA (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between TRACON controllers and pilots is also supported by the RDVS IIA.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS IIA systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Small Tower Voice Switch

The Small Tower Voice Switch (STVS) is installed in small Airport Traffic Control Towers (ATCT) and in Flight Service Stations (FSS). The basic STVS has four operator positions. The STVS provides the Air Traffic Control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and Air Route Traffic Control Center (ARTCC) controllers/ Terminal Radar Approach Control (TRACON) controllers/FSS specialists/air traffic control system command center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the STVS. The STVS (installed in the FSS) provides the ATC operational G/G voice communications interconnectivity between specialists within an FSS (intercom), interconnectivity between specialists in separate FSSs (interphone), and interconnectivity between FSS specialists and Air Route Traffic Control Center (ARTCC) controllers/Terminal Radar Approach Control (TRACON) controllers/ATCT controllers/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground radio connectivity between FSS specialists and pilots is also supported by the STVS.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate STVS systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Standard Automation Platform Convergence Phase 1 (key system)

The purpose of Standard Automation Platform Convergence Phase 1 (SAP Conv P1) is to reduce both procurement and recurring costs by standardizing and sharing as many hardware and software ATC Automation components as possible.

An engineering convergence task will begin in fiscal year 2005 and run through 2015. All components from each of the automation systems (STARS, ERAM, TFM, etc.) will be analyzed, and the "best of breed" and "core" components will be selected. SAP convergence will be performed in the following areas: (1) Hardware; (2) System Software (operating systems, Commercial-Off-The-Shelf tools, etc.); (3) ATC applications that can be shared across domains; (4) ATC applications that are unique to a domain; and (5) ATC system support tools that can be shared across domains (adaptation, data extraction or systems analysis recording, data reduction and analysis tools, etc.). Proven STARS and ERAM components will be slected, integrated into the SAP, and rigorously tested for replacing STARS and ERAM components at or near their end of service life.

Prototyping begun under Phase 1 will continue with SAP Conv P2. The results of both efforts will lead to refining the requirements to develop the SAP WS mechanism with SDP and FOMS applications.

Standard Automation Platform Remote Workstation Phase 1 (key system)

The SAP RW provides the controller in the tower and the specialist in Flight Advisory Services an interface to the Flight Object Management System and Surveillance Data Processor. The workstation additionally provides the tower controller a display of arrival/departure surveillance data.

Surface Traffic Information Processor

The STIP would be an extension of the Automatic Dependent Surveillance-Broadcast (ADS-B)/Traffic Information Service - Broadcast (TIS-B) capability at 60 large airports equipped with Airport Surface Detection Equipment (ASDE) Model X or Model 3 systems. A processor would be added at each of these airports to support Traffic Information Service-Broadcast (TIS-B) services for surface and nearby low-altitude traffic. The STIP will receive surveillance information from the ASDE-X or ASDE-3 system and generate TIS-B messages for delivery by the Broadcast Services Ground Stations (BSGSs) providing surface coverage at that airport. The STIP will support of subset of the functionality of the TIS-FIS Broadcast Server (that is intended to support TIS-B for airborne users), but the STIP will support a more real-time TIS-B service with a higher update rates and lower latency consistent with the available surface surveillance data source and the needs to support surface movement operations.

Surveillance Data Network (key system)

National Airspace System (NAS) surveillance systems, including radar and automatic dependent surveillance systems will provide surveillance data objects via the Surveillance Data Network (SDN), which is a sub-network of the System Wide Information Management (SWIM) and the FAA Telecommunication Infrastructure (FTI). The published Surveillance Data Objects (SDO) will be made available to NAS and other users, including the Transportation Security Administration, Department of Defense, and others. Surveillance data availability supports 3-mile separation standards, gate-to-gate traffic management, seamless airspace, and dynamic resectorization. Improved surveillance information is provided in a timely and consistent manner seamlessly across the NAS for operations, planning, and decision making. The information will be available to all users and service providers via SDO in near real time. This information enables decisions to be based on a shared common view of situations, even as conditions are changing. Improved surveillance with SDOs will provide the automation higher quality of data for seamless surveillance and, in combination with other capabilities and new procedures, enable capacity and safety improvements. These benefits accrue from increased situation awareness by decision makers and improved operation of decision support and analysis tools that use surveillance information.

Surveillance Data Processor (key system)

SDP is a component of SAP and operates in En Route and Terminal. The SDP will make improvements to sensors and automation systems that will allow for expanded use of 3-mile separation and terminal procedures. The operational improvements enable more efficient control of aircraft and use of airspace. To accomplish this, all 1030/1090 Beacon interrogators will be upgraded to disseminate their existing 1.2 milli-radian azimuth accuracy and other information, such as time of measurement, confidence, quality, and so on. The automation system algorithms will be improved or new algorithms will be developed to exploit the additional information content of the improved surveillance reports. The method of presentation (display) to support 3-mile separation will be developed and tested to ensure safety. The existing long-range sensor surveillance update period is (12 seconds) and is insufficient to support 3-mile separation. In areas where only long-range sensors exist and where the Air Traffic Service requires 3-mile separation, these sensors may be modified to double the update rate to achieve 3-mile separation.

Ultra High Frequency Airborne Radios

The Ultra High Frequency Avionics (UHF Avionics) are analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225-400 MHz frequency band, which are multi-channel transceivers, installed in an airborne military platform. These airborne devices support the tactical two-way voice communications/ coordination between the military pilot in the military aircraft and the controller on the ground.

Ultra High Frequency Ground Radios

Ultra High Frequency (UHF) Ground Radios are analog UHF amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 Mhz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and flight service station domains.

Ultra High Frequency Ground Radios - Replacement

The Ultra High Frequency Ground Radios - Replacement (UHF Ground Radios - Repl) mechanism represents analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 MHz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and Flight Service Station domains.

Very High Frequency Airborne Radios

Very High Frequency (VHF) Airborne Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 Mhz frequency band which are multi-channel transceivers installed in an airborne platform (e.g., commercial, cargo, and general aviation aircraft). These airborne devices support the tactical two-way voice communications/coordination between the pilot in the aircraft and the controller on the ground.

Very High Frequency Ground Radios

Very High Frequency (VHF) Ground Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 MHz frequency band which are single-channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the pilot in commercial, cargo, or general aviation aircraft in the oceanic, en route (i.e., ARTCC), terminal (i.e., TRACON/tower), and flight service station domains. Additionally, there are analog VHF frequency modulation (VHF - FM) radio devices operating in the 161 - 174 MHz frequency band that are multi-channel transceivers. These transceivers are used by flight inspection, aviation security, and airway facility specialists supporting local airport operations and maintenance or to perform their operational maintenance mission in support of the NAS. However, these same VHF-FM transceivers are also used to support the resolution of emergency situations or establish a level of voice command and control communications/coordination during disaster recovery.

Very High Frequency Mobile Radios

Very High Frequency (VHF) Mobile Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 Mhz frequency band which are multi-channel transceivers installed in surface vehicles (e.g., "follow-me," maintenance, administrative, and snow-removal vehicles). These devices support the tactical two-way voice communications/coordination between the operators in the vehicles and the tower controllers or airline operations personnel.

Support Activities

AT Training for Provide enhanced aircraft target data to Service Providers for Surface Movement and Runway Separation

Air Traffic (AT) training is provided to the AT workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AT Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

FAA Adaptation for Provide enhanced aircraft target data to Service Providers for Surface Movement and Runway Separation

Many NAS systems incorporate parameters that are adjustable. This allows for the setting of system parameters to optimize performance at each particular site. When new systems that have adjustable parameters are introduced into the NAS, adaptation data must be developed for the system. Environmental and procedural changes may also result in the need to modify FAA Adaptation Data. Generally, adaptation will begin 12 months before IOC and continue until 12 months after IOC.

FAA Certification for Provide enhanced aircraft target data to Service Providers for Surface Movement and Runway Separation

FAA certification is an activity necessary to support people and systems in the delivery of NAS services. Avionics and associated systems are deemed to be critical to the safety of flight and must be certificated. In addition certain operators and service providers require to be certified such as pilots, dispatchers and others. Certification will generally begin 24 months prior to Initial Operating Capability, and be complete prior to receiving or giving service.

FAA Flight Check for Provide enhanced aircraft target data to Service Providers for Surface Movement and Runway Separation

FAA Flight Check is an activity necessary to certify navigational aids required to deliver NAS services. Flight checks ensure that performance standards are met and are completed up to 90 days before Initial Operating Capability to insure safety.

FAA Spectrum Engineering for Provide enhanced aircraft target data to Service Providers for Surface Movement and Runway Separation

FAA Spectrum Engineering ensures that radio frequency spectrum is available before developing or procuring new communications-electronics systems.

FAA Standards for Provide enhanced aircraft target data to Service Providers for Surface Movement and Runway Separation

FAA standards development is an activity necessary to support people and systems in the delivery of NAS services. FAA Standards establish rules for the measure of quantity, weight, extent, value, or quality.

People

Ground Controller

A Ground Controller performs the following activities: Ensure separation; Control vehicles as well as aircraft on movement areas other than active runways Initiate control instructions; Monitor and operate communications equipment; Utilize tower radar display(s); Utilize alphanumerics; Assist the tower associate controller with coordination; Scan tower cab environment; Ensure computer entries and strip marking are completed for instructions or clearances issued or received; Process and forward flight plan information; Perform any functions of the tower team which will assist in meeting situation objectives; Coordinate with local control for safe and efficient use of runways and movement areas.

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Surface Vehicle Operator

Ground personnel operate vehicles on the airport surface to support aircraft service, maintenance and other operations. Ground, local, or ramp controllers may provide separation from other ground traffic (aircraft or vehicles) at controller airports. Pilots and ground personnel work together to ensure safe movement of aircraft at all airports.

Interfaces

Surveillance Data Processor — (Track Data) → Standard Automation Platform Remote Workstation Phase 1

The SDP provides track data to the SAP RW for display to tower controllers.

Issues

Need a concept of use for positions with tags as support for situational awareness (traffic advisory) versus separation. There is the potential for the service provider to developing dependencies on the displayed information in support separation functions. When does situational awareness become separation support?

Provide Enhanced Surface Target Displays to Service Provider for Surface Movement and Runway Separation
(102405)

The increase in and fidelity of information provided to tower controllers enhance and enrich the operational moving environment of the airport surface. Automated systems display and advise the controller of the location of vehicles and aircraft. Automated broadcast of aircraft and vehicle position to ground sensors/receivers provides a comprehensive digital display of the runway and taxi environment. This complements visual observation when poor visibility or distance impairs the controllers surveillance of the airport surface. Decision support system algorithms enhance target displays, and the displays support identifying and alerting aircraft and vehicles that may enter into a runway incursion environment. Target displays and decision support systems provide high-fidelity runway incursion alerts to controllers.

30-Jun-2015 to 30-Jun-2024

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Separation Enhancement of the operational movement environment of the airport surface is due to delivery of more information and increased fidelity of information to tower controllers (System Wide Information Management, Surveillance Data Network, SWIM Management Unit). Automated systems display and advise the controller of the location of vehicles and aircraft (Integrated Information Workstation (IIW), Standard Automation Platform, Remote Workstation). Target displays are enhanced with decision support system (DSS) algorithms to support Identification and alerting of aircraft and vehicles that may enter into a runway incursion environment (IIW). Since all taxi clearances are developed and captured in surface DSS (IIW), the addition of tags for all vehicles allows for automatic conformance monitoring/adherence to taxi clearances. In many cases, this increases the lead-time for detecting deviations, which reduces the likelihood that the potential incursion will be captured early enough to be mitigated without disruption to normal flow or a large increase in workload.

Benefits

The benefits include: Increased safety through earlier detection of deviations that may lead to incursions. Reduced workload for service providers by providing automatic conformance monitoring of taxi clearances, thus potentially increasing individual productivity.

Systems

BSGS Broadcast Services Ground Station (key system)

The BSGS (Broadcast Services Ground Station) supports Air-Ground broadcast services. This includes the reception of ADS-B from equipped aircraft/vehicles and the transmission of Traffic Information Service-Broadcast (TIS-B) and Flight Information Service-Broadcast (FIS-B) for use by equipped aircraft. Generally, the BSGS will interface via the SDN to provide ADS-B information to ATC automation and receive TIS-B and FIS-B information from TIS-B and FIS-B servers. The BSGS includes antenna(s), one or more dual link (i.e., 1090 MHz Extended Squitter-1090ES and Universal Access Transceiver-UAT) Ground Based Transceiver(s)(GBT), processing functions and communications functions. Several configurations of the BSGS are required to support variations in the geographic service volume and functions to be supported at specific categories of operational sites. BSGSs will be installed at 448 airports and 100 en route locations. Included are those airports equipped with Secondary Surveillance Radar (SSR) and about 140 additional towered airports (currently without SSR). The BSGS will support ADS-B and TIS-B services via both the 1090ES link and by the UAT link. The BSGS will also support FIS-B via the UAT link. BSGSs incorporate a multilink gateway function that provides ADS-B rebroadcasts via the ADS-B alternate link. A BSGS incorporating 2 GBTs are required for airport surface and terminal surveillance coverage at each of 268 smaller airports, a BSGS incorporating 3 GBTs (on average) are required at 120 of the mid-sized airports, and a BSGS incorporating 6 GBTs (on average) are required at the 60 largest airport (those equipped with ASDE-X or ASDE-3 surface surveillance systems).

The following BSGS functions are required to support the various categories of NAS BSGS sites, except as noted below: (1) 1090ES and UAT receive/transmit (i.e., the GBT funnction); (2) multi-link gateway function; (3) process received ADS-B messages and output (via the SDN) ADS-B reports for use by ATC automation; (4) accept TIS-B and FIS-B information from ground TIS-B/FIS-B servers and manage the generation and broadcast of link specific TIS-B messages via the 1090ES and UAT links and FIS-B messages via the UAT link.

The following BSGS configurations are assumed based on the category of the operational site. Except as noted below all BSGS configuration support the above described functions.

En route (100 sites): (1) One multi-sector antenna with each sector connected to the individual 1090ES and UAT receivers. Supports up to 250 nmi. ADS-B reception. En route locations that are intended to provide only low-altitude gap filler coverage do not require the long-range capability. (2) One omni-directional transmit antenna. Transmitter power sized to support the required TIS-B and FIS-B coverage for that specific site.

Terminal/Airport without ASDE-X (415 airports incl. 27 ASDE-3 equipped airports) with each site having: (1) BSGS with at least 2 GBTs with omni-directional antennas sited for both airport surface and terminal airspace coverage; (2) additional GBTs as needed to provide coverage of the primary airport surface movement area.

Terminal/Airport with ASDE-X (26 ASDE-X plus 7 upgraded ASDE-3 airports with an average of 6 GBTs per BSGS): (1) ASDE-X ground stations upgraded to support GBT functionality; (2) At least two of the GBTs provide ADS-B coverage to the edge of the terminal airspace and the TIS-B coverage; (3) ASDE provides the surveillance data source to support TIS-B for surface traffic.

Communications Management System (key system)

The CMS Management and Control function performs tasks for overall management and control of all air/ground and ground/ground voice and data communications to support System Wide Information Management (SWIM). CMS will also incorporate a reconfiguration control function to support reconfigurable airspace assignments, data routing, and a digital recording for both voice and data.

The En Route Automation Modernization program has assumed the data recording function via the Standard Automation

Platform, and the Digital Voice Recorder System performs the voice recording function. The CMS routing function is a data router that ensures transport of data communications among Air Traffic Control facilities and users of SWIM. Additionally, CMS integrates functionalities inherently provided by the voice switches, the voice recorders, and the ATN Router.

Digital Voice Recorder System Replacement

The Digital Voice Recorder System Replacement (DVRS Replacement) is a modern digital system used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

Enhanced Terminal Voice Switch

The Enhanced Terminal Voice Switches (ETVS) are installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) facilities with more than four air traffic controller positions. The ETVS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The ETVS (installed in the ATCT) provides the ATC operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the ETVS.

The ETVS (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within a TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the ETVS.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate ETVS systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Flexible Voice Switch (key system)

Voice communications is the primary means of communications among ATC facilities and between an Air Traffic Control Specialist (ATCS) and a pilot. Voice switching provides the ATCS both G/G Interfacility/Intrafacility and A/G voice communications connectivity. The NAS Voice Switch (NVS) program will replace aging voice switches and their analog interfaces with modern digital voice switches consisting of digital interfaces. The Flexible Voice Switch will be the common platform and baseline voice switch for all NAS domains with modularity and scalability to meet communications connectivity requirements. Additionally, this switch will be expandable to accommodate growth capacity requirements and able to support NAS Modernization needs as described in various Operational Improvements.

Flight Object Management System - Terminal (key system)

The FOMS is a component of the Standard Automation Platform (SAP). The FOMS processes flight data received from multiple sources via the System Wide Information Management (SWIM) Management Unit. The FOMS also receives track data from the Surveillance Data Processor (SDP) and associates tracks with flight data, producing the flight object, which is published to SWIM for subscriber use. Flight plan support functionality includes end-to-end profile evaluation in all phases of flight and evaluation against static and dynamic constraints (terrain, obstacles, airspace restrictions, etc.). The FOMS supports flight planning up to 180 days prior to day of flight. A user can access the flight object from initial to closeout in the same manner. The FOMS provides end-to-end flight data management from preflight to post analysis. Ownership of the flight object begins and ends with Traffic Flow Management and transitions during the flight to clearance delivery, ramp, surface, departure, transition to cruise, cruise, transition to arrival, and ramp. Flight data management is based on trajectory, assigned volumes, and "necessary" route structure.

Next Generation Traffic Flow Management (key system)

The Next Generation Traffic Flow Management (NG-TFM) system provides an array of automation and data processing tools for Traffic Management Specialists (TMS) and Traffic Management Coordinators (TMC), as well as a gateway that enables NAS users to make changes in flight schedules based on planned traffic initiatives (e.g., Ground Delay Programs) and other NAS data. This enhanced decision support system provides increased information exchange between FAA service providers and NAS users. NG-TFM receives flight schedules from NAS users (e.g., air carriers) and combines these with weather data, NAS status data, and planned traffic initiatives to generate detailed graphical and textual traffic displays as far as 24 hours into the future on both national and local scales. Features include both pre-flight and post-flight analysis tools, flight data archiving, enhanced traffic displays, traffic strategy (one or more initiatives) automation, "what if" strategy analysis, and automated TFM training tools.

NG-TFM is comprised of five different software component systems and will include a hardware and operating system software tech refresh. The complete NG-TFM software package includes changes to support interfaces with the Flight Object Management System (FOMS) and System Wide Information Management (SWIM). When complete, this will establish a new NG-TFM system baseline.

Radio Control Equipment

Radio Control Equipment (RCE), located at both ATC facilities and remote communication sites, control the operation of remotely located ground to air Very High Frequency/Ultra High Frequency (VHF/UHF) radios used by air traffic controllers to communicate with pilots. RCE interfaces with the voice switch at the ATC facility, telephone landlines, and ground to air radios at the En Route Remote Communications Air/Ground (RCAG) sites, Terminal Remote Transmitter/Receiver (RTR) sites, and Flight Service Station Remote Communications Outlet (RCO) sites.

Rapid Deployment Voice Switch Type I

The Rapid Deployment Voice Switch Type I (RDVS I) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS I (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center

(ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the RDVS I. The RDVS I (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the RDVS I.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS I systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Standard Automation Platform Convergence Phase 1 (key system)

The purpose of Standard Automation Platform Convergence Phase 1 (SAP Conv P1) is to reduce both procurement and recurring costs by standardizing and sharing as many hardware and software ATC Automation components as possible.

An engineering convergence task will begin in fiscal year 2005 and run through 2015. All components from each of the automation systems (STARS, ERAM, TFM, etc.) will be analyzed, and the "best of breed" and "core" components will be selected. SAP convergence will be performed in the following areas: (1) Hardware; (2) System Software (operating systems, Commercial-Off-The-Shelf tools, etc.); (3) ATC applications that can be shared across domains; (4) ATC applications that are unique to a domain; and (5) ATC system support tools that can be shared across domains (adaptation, data extraction or systems analysis recording, data reduction and analysis tools, etc.). Proven STARS and ERAM components will be slected, integrated into the SAP, and rigorously tested for replacing STARS and ERAM components at or near their end of service life.

Prototyping begun under Phase 1 will continue with SAP Conv P2. The results of both efforts will lead to refining the requirements to develop the SAP WS mechanism with SDP and FOMS applications.

Standard Automation Platform Convergence Phase 2

Standard Automation Platform Convergence Phase 2 (SAP Conv P2) continues with prototyping started under Phase 1 to insure that recurring and technical refresh costs for ATC automation elements are minimized by using as many common components as prossible.

SAP Phase 2 incorporates upgrades and technical refreshes of ATC applications, systems software, and hardware to ensure use of common elements across the terminal, enroute, oceanic, command center, and airport surface ATC Automation domains.

Prototyping will conclude with Phase 2, and the results will lead to refining the requirements for development of the SAP WS mechanism with SDP and FOMS applications.

Standard Automation Platform Remote Workstation Phase 1 (key system)

The SAP RW provides the controller in the tower and the specialist in Flight Advisory Services an interface to the Flight Object Management System and Surveillance Data Processor. The workstation additionally provides the tower controller a display of arrival/departure surveillance data.

Standard Automation Platform Remote Workstation Phase 2

Provides Technical Refresh of SAP Remote Workstation Phase 1. The SAP RW provides the controller in the tower and the specialist in Flight Advisory Services an interface to the Flight Object Management System and Surveillance Data Processor. The workstation additionally provides the tower controller a display of arrival/departure surveillance data.

Standard Automation Platform Workstation Phase 1 (key system)

The SAP consists of the Flight Object Management System (FOMS), the Surveillance Data Processor (SDP), and the SAP Workstation. The SAP will be installed in En Route and Arrival/Departure facilities. The SDP performs surveillance data processing and tracking on Surveillance Data Objects received from the Surveillance Data Network. The FOMS performs flight plan processing, associates flight and track data, and publishes the Flight Object on the System Wide Information Management network. The SAP workstation provides the controller interface for the FOMS and SDP.

Surface Traffic Information Processor

The STIP would be an extension of the Automatic Dependent Surveillance-Broadcast (ADS-B)/Traffic Information Service - Broadcast (TIS-B) capability at 60 large airports equipped with Airport Surface Detection Equipment (ASDE) Model X or Model 3 systems. A processor would be added at each of these airports to support Traffic Information Service-Broadcast (TIS-B) services for surface and nearby low-altitude traffic. The STIP will receive surveillance information from the ASDE-X or ASDE-3 system and generate TIS-B messages for delivery by the Broadcast Services Ground Stations (BSGSs) providing surface coverage at that airport. The STIP will support of subset of the functionality of the TIS-FIS Broadcast Server (that is intended to support TIS-B for airborne users), but the STIP will support a more real-time TIS-B service with a higher update rates and lower latency consistent with the available surface surveillance data source and the needs to support surface movement operations.

Surveillance Data Network (key system)

National Airspace System (NAS) surveillance systems, including radar and automatic dependent surveillance systems will provide surveillance data objects via the Surveillance Data Network (SDN), which is a sub-network of the System Wide Information Management (SWIM) and the FAA Telecommunication Infrastructure (FTI). The published Surveillance Data Objects (SDO) will be made available to NAS and other users, including the Transportation Security Administration, Department of Defense, and others. Surveillance data availability supports 3-mile separation standards, gate-to-gate traffic management, seamless airspace, and dynamic resectorization. Improved surveillance information is provided in a timely and consistent manner seamlessly across the NAS for operations, planning, and decision making. The information will be available to all users and service providers via SDO in near real time. This information enables decisions to be based on a shared common view of situations, even as conditions are changing. Improved surveillance with SDOs will provide the automation higher quality of data for seamless surveillance and, in combination with other capabilities and new procedures, enable capacity and safety improvements. These benefits accrue from increased situation awareness by decision makers and improved operation of decision support and analysis tools that use surveillance information.

Surveillance Data Processor (key system)

SDP is a component of SAP and operates in En Route and Terminal. The SDP will make improvements to sensors and automation systems that will allow for expanded use of 3-mile separation and terminal procedures. The operational improvements enable more efficient control of aircraft and use of airspace. To accomplish this, all 1030/1090 Beacon interrogators will be upgraded to disseminate their existing 1.2 milli-radian azimuth accuracy and other information, such as time of measurement, confidence, quality, and so on. The automation system algorithms will be improved or new algorithms will be developed to exploit the additional information content of the improved surveillance reports. The method of presentation (display) to support 3-mile separation will be developed and tested to ensure safety. The existing long-range sensor surveillance update period is (12 seconds) and is insufficient to support 3-mile separation. In areas where only long-range sensors exist and where the Air Traffic Service requires 3-mile separation, these sensors may be modified to double the update rate to achieve 3-mile separation.

Ultra High Frequency Ground Radios - Replacement

The Ultra High Frequency Ground Radios - Replacement (UHF Ground Radios - Repl) mechanism represents analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 MHz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and Flight Service Station domains.

Very High Frequency Ground Radios

Very High Frequency (VHF) Ground Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 MHz frequency band which are single-channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the pilot in commercial, cargo, or general aviation aircraft in the oceanic, en route (i.e., ARTCC), terminal (i.e., TRACON/tower), and flight service station domains. Additionally, there are analog VHF frequency modulation (VHF - FM) radio devices operating in the 161 - 174 MHz frequency band that are multi-channel transceivers. These transceivers are used by flight inspection, aviation security, and airway facility specialists supporting local airport operations and maintenance or to perform their operational maintenance mission in support of the NAS. However, these same VHF-FM transceivers are also used to support the resolution of emergency situations or establish a level of voice command and control communications/coordination during disaster recovery.

Support Activities

FAA Adaptation for Provide Enhanced Surface Target Displays to Service Provider for Surface Movement and Runway Separation

Many NAS systems incorporate parameters that are adjustable. This allows for the setting of system parameters to optimize performance at each particular site. When new systems that have adjustable parameters are introduced into the NAS, adaptation data must be developed for the system. Environmental and procedural changes may also result in the need to modify FAA Adaptation Data. Generally, adaptation will begin 12 months before IOC and continue until 12 months after IOC.

FAA Certification for Provide Enhanced Surface Target Displays to Service Provider for Surface Movement and Runway Separation

FAA certification is an activity necessary to support people and systems in the delivery of NAS services. Avionics and associated systems are deemed to be critical to the safety of flight and must be certificated. In addition certain operators and service providers require to be certified such as pilots, dispatchers and others. Certification will generally begin 24 months prior to Initial Operating Capability, and be complete prior to receiving or giving service.

FAA Spectrum Engineering for Provide Enhanced Surface Target Displays to Service Provider for Surface Movement and Runway Separation

FAA Spectrum Engineering ensures that radio frequency spectrum is available before developing or procuring new communications-electronics systems.

FAA Standards for Provide Enhanced Surface Target Displays to Service Provider for Surface Movement and Runway Separation

FAA standards development is an activity necessary to support people and systems in the delivery of NAS services. FAA Standards establish rules for the measure of quantity, weight, extent, value, or quality.

Non-FAA Certification for Provide Enhanced Surface Target Displays to Service Provider for Surface Movement and Runway Separation

FAA standards are applied to user activities necessary to support people and systems in the delivery of NAS services. Aviation avionics and equipment is deemed to be critical to the safety of flight and must be certificated. It is also necessary to certify aviation personnel compliance with these standards. Certification will generally begin 24 months prior to Initial Operating Capability, and be complete prior to receiving service.

Non-FAA Pilot Procedure Development for Provide Enhanced Surface Target Displays to Service Provider for Surface Movement and Runway Separation

A number of NAS users document the way their activities are to be carried out. The introduction of new systems, or changes to existing systems may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development will generally begin once ATC procedures have been established and be complete by 90 days prior to Initial Operating Capability, in order to facilitate training.

Non-FAA Pilot Training for Provide Enhanced Surface Target Displays to Service Provider for Surface Movement and Runway Separation

Non-FAA Pilot Training is provided to educate pilots as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional pilot training. Training will generally begin 60 days prior to IOC and be complete within one year following Full Operating Capability.

Non-FAA Procedure Development for Provide Enhanced Surface Target Displays to Service Provider for Surface Movement and Runway Separation

A number of NAS users document the way their activities are to be carried out. The introduction of new systems, or changes to existing systems may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development will generally begin once ATC procedures have been established and be complete by 90 days prior to Initial Operating Capability, in order to facilitate training.

People

Ground Controller

A Ground Controller performs the following activities: Ensure separation; Control vehicles as well as aircraft on movement areas other than active runways Initiate control instructions; Monitor and operate communications equipment; Utilize tower radar display(s); Utilize alphanumerics; Assist the tower associate controller with coordination; Scan tower cab environment; Ensure computer entries and strip marking are completed for instructions or clearances issued or received; Process and forward flight plan information; Perform any functions of the tower team which will assist in meeting situation objectives; Coordinate with local control for safe and efficient use of runways and movement areas.

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Surface Vehicle Operator

Ground personnel operate vehicles on the airport surface to support aircraft service, maintenance and other operations. Ground, local, or ramp controllers may provide separation from other ground traffic (aircraft or vehicles) at controller airports. Pilots and ground personnel work together to ensure safe movement of aircraft at all airports.

Interfaces

Communications Management System ← (Data Communication) → Communications Management System

Controllers in the same or different facilities communicate via CMS.

Communications Management System ← (Voice Communication) → Communications Management System

Controllers in the same or different facilities communicate via CMS.

Flight Object Management System - Terminal — (Flight Data) → BSGS Broadcast Services Ground Station

FOMS sends flight data to the GBT for broadcast to aircraft.

Flight Object Management System - Terminal ← (Flight Data) → Next Generation Traffic Flow Management

FOMS and NG-TFM exchange flight data.

Flight Object Management System - Terminal ← (Flight Data) → Standard Automation Platform Remote Workstation Phase 1

FOMS exchanges flight plan data with the SAP RW.

Flight Object Management System - Terminal — (Flight Data) → Standard Automation Platform Workstation Phase 1

FOMS provides the flight object to the SAP WS for display to the controller.

Next Generation Traffic Flow Management — (NAS Status Data) → Communications Management System

NG-TFM determines the best use of NAS resources and directs CMS to reconfigure communication resources accordingly.

Surveillance Data Processor — (Surveillance Data) → BSGS Broadcast Services Ground Station

The SDP provides surveillance data for aircraft that are not responding to beacon interrogations or providing ADS-B reports to the GBT for transmission up both the UAT and 1090 links.

Surveillance Data Processor — (Track Data) → Flight Object Management System - Terminal

SDP sends correlated surveillance data to FOMS for further processing, including association with flight data.

Surveillance Data Processor — (Track Data) → Standard Automation Platform Remote Workstation Phase 1

The SDP provides track data to the SAP RW for display to tower controllers.

Surveillance Data Processor — (Surveillance Data) → Standard Automation Platform Workstation Phase 1

The SDP sends surveillance data to the SAP WS for display to the controller.

Issues

Need to develop a concept of use for DSS to support development and delivery of taxi-clearances. The tie to traffic synchronization and the potential need to included digital delivery via datalink to make the concept operational advantageous. Certification and policy issues related to conformance monitoring by DSS – changes in roles and service provider behavior.

Service Group Air Traffic Services

Service ATC-Separation Assurance

Capability Surface Separation Capability

Operational Improvement

Provide Surface Situation to Pilots and Service Providers and Vehicle Operators for All-weather Surface Operations

(102409)

As target displays improve and information is enriched regarding the movement areas, automation provides the enhanced controller tools to manage airport surface traffic. The decision support system (DSS) provides for dynamic planning of surface movements to include automated event trigger information that records time-over-spot. Air traffic controllers receive DSS-enhanced aircraft and vehicle-speed information to provide intent and performance monitoring to further facilitate alerting aircraft of runway incursions and overall safety of the airport movement area. The information-rich airport surface environment includes nearby airspace with the same fidelity to complete the movement picture of arriving and departing aircraft and the airport surface. The service provider furnishes traffic management services to aircraft equipped with capability to simulate visual meteorological conditions so that they can maneuver on the surface during low-visibility and zero-visibility operations.

31-Jan-2016 to 22-Apr-2022

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Operators for All-Weather Surface Operations Improved target displays and information enrich visualization of the movement area (Integrated Information Workstation, Surveillance Data Processor, Surveillance Data Network, Ground Based Transceivers (GBT). Automated broadcast of aircraft and vehicle position to ground sensors/receivers provide comprehensive and common digital depiction of the runway and taxi (GBT). Equipped with both transmitters and receivers, the pilot, service provider, and the vehicle operator will have a complete and common display of the movement area. Aircraft equipage for surface operation is widespread, and the Decision Support System (DSS) automates surface movement for sequencing and movement information. Automation provides the controller enhanced tools to manage airport surface traffic. Automated data-link information is continuously provided to the cockpit to include current weather information, location, speed and intent of other vehicles operating on the surface. The DSS enables dynamic planning of surface movements to include automated event trigger information that record time-over-spot. Controllers receive aircraft and vehicle speed information enhanced by the DSS to provide intent and performance monitoring to further facilitate alerting of runway incursions and overall safety of the airport movement area (Communications Management System, Flight Object Management System, Standard Automation Platform (SAP) Remote Workstation. The information-rich airport surface environment will include nearby airspace with the same fidelity to complete the movement picture of arriving and departing aircraft and the airport surface. Conflict alert logic is included in runway incursion tools to provide pilots increased notification of hazardous situations. The service provider will extend traffic management services to aircraft equipped with visual meteorological condition (VMC)-like capability so that the aircraft can maneuver on the surface during low-visibility and zero-visibility operations. Cockpit equipage includes moving maps and digital views of the runway and taxiways to allow movement on the surface in zero-visibility conditions. Airport visual weather conditions will not negate flow of traffic, as cockpits will provide near-visual condition information to the pilot through automation, target display, and ground sensors. Controller voice instructions (Next Generation Air/Ground Communications) will be used to back up automated and data-linked delivery of clearances and other information to aircraft, since automated and DSSs will be the primary tools (New Generation Traffic Flow Management). Smart sensors on the airport will transmit real-time reports on the physical status of the movement area, including the presence of foreign object debris, icing, and breaking action that can impede flight operations.

Benefits

There is common situational awareness of all operators on the surface. Maintenance of near VMC-throughput in low visibility: Allows efficient taxi clearance assignments. Reduces need for Strategic Flow initiatives.

Systems

Aeronautical Information Management (key system)

The AIM system represents the evolution of the acquisition, storage, processing and dissemination of aeronautical information in the NAS. Aeronautical information is defined as any information concerning the establishment, condition, or change in any component (facility, service, or procedure of, of hazard) of the National Airspace System. Aeronautical information comes in two types a somewhat static type, and a more dynamic type. The static portion represents the aeronautical information baseline as a particular date, while the dynamic portion updates particular aspects of the static portion due to system impacts or events. The Static portion represents data that NAS automation systems and other users use to adapt their software to properly operate. The dynamic portion represents information typically contained in NOTAMs that indicate short-term changes to the static data.

Many NAS systems support the acquisition, generation, and dissemination of the static aeronautical information. Information of this type includes airspace structures, airways, locations of NAS facilities, inter-facility letters of agreement and memorandums of understanding, obstructions, standard procedures, airspace charts, etc.

Several NAS systems also support the acquisition, generation, processing, and dissemination of the dynamic aeronautical information. Information of this type includes, facility outages, runway closures, temporary flight restrictions, airspace constraints, SIGMETs, etc. This information must be disseminated to users and providers of air traffic services in a timely and efficient manner.

AIM will provide the central point for the dissemination of high quality, configuration controlled information to NAS systems, service providers and users of the NAS. AIM will disseminate data based on the Aeronautical Information Exchange Model (AIXM) protocols.

BSGS Broadcast Services Ground Station (key system)

The BSGS (Broadcast Services Ground Station) supports Air-Ground broadcast services. This includes the reception of ADS-B from equipped aircraft/vehicles and the transmission of Traffic Information Service-Broadcast (TIS-B) and Flight Information Service-Broadcast (FIS-B) for use by equipped aircraft. Generally, the BSGS will interface via the SDN to provide ADS-B information to ATC automation and receive TIS-B and FIS-B information from TIS-B and FIS-B servers. The BSGS includes antenna(s), one or more dual link (i.e., 1090 MHz Extended Squitter-1090ES and Universal Access Transceiver-UAT) Ground Based Transceiver(s)(GBT), processing functions and communications functions. Several configurations of the BSGS are required to support variations in the geographic service volume and functions to be supported at specific categories of operational sites. BSGSs will be installed at 448 airports and 100 en route locations. Included are those airports equipped with Secondary Surveillance Radar (SSR) and about 140 additional towered airports (currently without SSR). The BSGS will support ADS-B and TIS-B services via both the 1090ES link and by the UAT link. The BSGS will also support FIS-B via the UAT link. BSGSs incorporate a multilink gateway function that provides ADS-B rebroadcasts via the ADS-B alternate link. A BSGS incorporating 2 GBTs are required for airport surface and terminal surveillance coverage at each of 268 smaller airports, a BSGS incorporating 3 GBTs (on average) are required at 120 of the mid-sized airports, and a BSGS incorporating 6 GBTs (on average) are required at the 60 largest airport (those equipped with ASDE-X or ASDE-3 surface surveillance systems).

The following BSGS functions are required to support the various categories of NAS BSGS sites, except as noted below: (1) 1090ES and UAT receive/transmit (i.e., the GBT funnction); (2) multi-link gateway function; (3) process received ADS-B messages and output (via the SDN) ADS-B reports for use by ATC automation; (4) accept TIS-B and FIS-B information from ground TIS-B/FIS-B servers and manage the generation and broadcast of link specific TIS-B messages via the 1090ES and UAT links and FIS-B messages via the UAT link.

The following BSGS configurations are assumed based on the category of the operational site. Except as noted below all BSGS configuration support the above described functions.

En route (100 sites): (1) One multi-sector antenna with each sector connected to the individual 1090ES and UAT receivers. Supports up to 250 nmi. ADS-B reception. En route locations that are intended to provide only low-altitude gap filler coverage do not require the long-range capability. (2) One omni-directional transmit antenna. Transmitter power sized to support the required TIS-B and FIS-B coverage for that specific site.

Terminal/Airport without ASDE-X (415 airports incl. 27 ASDE-3 equipped airports) with each site having: (1) BSGS with at least 2 GBTs with omni-directional antennas sited for both airport surface and terminal airspace coverage; (2) additional GBTs as needed to provide coverage of the primary airport surface movement area.

Terminal/Airport with ASDE-X (26 ASDE-X plus 7 upgraded ASDE-3 airports with an average of 6 GBTs per BSGS): (1) ASDE-X ground stations upgraded to support GBT functionality; (2) At least two of the GBTs provide ADS-B coverage to the edge of the terminal airspace and the TIS-B coverage; (3) ASDE provides the surveillance data source to support TIS-B for surface traffic.

Cockpit Display of Traffic Information Avionics (key system)

The Cockpit Display of Traffic Information Avionics (CDTI Avionics) is a generic name for a display that provides the flight crew with surveillance information about other proximate aircraft, including their position. It enables pilots to electronically "see and avoid" other aircraft.

Communications Management System (key system)

The CMS Management and Control function performs tasks for overall management and control of all air/ground and ground/ground voice and data communications to support System Wide Information Management (SWIM). CMS will also incorporate a reconfiguration control function to support reconfigurable airspace assignments, data routing, and a digital recording for both voice and data.

The En Route Automation Modernization program has assumed the data recording function via the Standard Automation Platform, and the Digital Voice Recorder System performs the voice recording function. The CMS routing function is a data router that ensures transport of data communications among Air Traffic Control facilities and users of SWIM. Additionally, CMS integrates functionalities inherently provided by the voice switches, the voice recorders, and the ATN Router.

Digital Voice Recorder System Replacement

The Digital Voice Recorder System Replacement (DVRS Replacement) is a modern digital system used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

Enhanced Terminal Voice Switch

The Enhanced Terminal Voice Switches (ETVS) are installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) facilities with more than four air traffic controller positions. The ETVS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The ETVS (installed in the ATCT) provides the ATC operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the ETVS.

The ETVS (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within a TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the ETVS.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate ETVS systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Flexible Voice Switch (key system)

Voice communications is the primary means of communications among ATC facilities and between an Air Traffic Control Specialist (ATCS) and a pilot. Voice switching provides the ATCS both G/G Interfacility/Intrafacility and A/G voice communications connectivity. The NAS Voice Switch (NVS) program will replace aging voice switches and their analog interfaces with modern digital voice switches consisting of digital interfaces. The Flexible Voice Switch will be the common platform and baseline voice switch for all NAS domains with modularity and scalability to meet communications connectivity requirements. Additionally, this switch will be expandable to accommodate growth capacity requirements and able to support NAS Modernization needs as described in various Operational Improvements.

Flight Object Management System - Terminal (key system)

The FOMS is a component of the Standard Automation Platform (SAP). The FOMS processes flight data received from multiple sources via the System Wide Information Management (SWIM) Management Unit. The FOMS also receives track data from the Surveillance Data Processor (SDP) and associates tracks with flight data, producing the flight object, which is published to SWIM for subscriber use. Flight plan support functionality includes end-to-end profile evaluation in all phases of flight and evaluation against static and dynamic constraints (terrain, obstacles, airspace restrictions, etc.). The FOMS supports flight planning up to 180 days prior to day of flight. A user can access the flight object from initial to closeout in the same manner. The FOMS provides end-to-end flight data management from preflight to post analysis. Ownership of the flight object begins and ends with Traffic Flow Management and transitions during the flight to clearance delivery, ramp, surface, departure, transition to cruise, cruise, transition to arrival, and ramp. Flight data management is based on trajectory, assigned volumes, and "necessary" route structure.

General Weather Processor (key system)

The GWP collects, analyzes, tailors, displays, and distributes weather products. The GWP receives weather data from multiple sensors and distributes processed and tailored weather information via System Wide Information Management. The GWP provides a standard set of algorithms and access to data/products that convey current and future status of impacting weather to all National Airspace System services.

Integrated Information Workstation - Build 1 (key system)

IIW Build 1 will include the infrastructure and system interfaces to acquire, analyze, store, update, display, and manage the following information in an integrated manner: (1) National Airspace System (NAS) aeronautical, (2) airport environmental, (3) airborne and surface surveillance, (4) flight information, (5) weather information, and (6) NAS status. Build 1 will also replace its predecessor system, FAA Data Display System, as well as interface with the following systems in support of its mission: Flight Object Management, System Wide Information Management, Next Generation- Traffic Flow Management, Maintenance Management System, Unified Decision Management System, and Aeronautical Information Management.

Integrated Information Workstation - Build 2

Build 2 will incorporate new hardware technology and software enhancements through a technical refresh program.

Multi-Mode Digital Radios

Multi-Mode Digital Radios (MDRs) are ground-based Very High Frequency (VHF) air-traffic-control radios that can operate in several configurations: 1) analog voice with 25kHz channel spacing; 2) analog voice with 8.33 kHz channel spacing; and 3) VHF Data Link (VDL) Mode-3 which consists of two-way digital voice and data communication.

National Airspace System Infrastructure Management System Phase 2 (key system)

National Airspace System Infrastructure Management System (NIMS) Phase 2 will enhance resource and enterprise management, by developing NAS customer and user interaction tools, and providing additional performance and cost trend analysis. The NIMS will provide status information to all NAS users in near real time via the System Wide Information Management (SWIM) system. NIMS Phase 2 will enhance NIMS Phase 1 by providing the tools to achieve the concept of NAS Infrastructure Management (NIM). This new approach to the operation and maintenance of the NAS infrastructure will incorporate a performance-based service management approach that is focused on achieving user and customer satisfaction and managing NAS infrastructure services. The key characteristics of the NIM concept are: 1. Consolidating expertise in control centers to provide rapid, effective response to customer needs, support centralized operational control, and gain efficiencies. 2. Centralized Remote Monitoring and Control of NAS infrastructure services and systems to provide efficient service delivery and systems management. 3. Nationwide Operations Planning to provide standardized field operations across the NAS to facilitate consistent interaction with customers. 4. Information Infrastructure to provide real-time information collection and distribution to provide common NAS performance metrics and cost accounting. 5. Performance Based Management to provide data for the prioritization of maintenance activities and investment decisions.

The NIMS Enterprise Management (EM) will monitor and control NAS subsystems, equipment, resources and the NIMS. An Enterprise Manager Suite, consisting of commercially available hardware and software components, is installed at each of the four Operations Control Centers. The NIMS Resource Manager (RM) will support all NIMS Resource Functions. The NIMS RM, consisting of commercially available hardware and software components, is installed at each of the four Operations Control Centers.

The NIMS Enterprise Manager will be integrated with the NIMS Resource Manager to provide, Automated Incident Ticketing, a Common Logging System, Real Time System Performance Monitoring, and a Centralized Logistics/Maintenance System.

Next Generation Traffic Flow Management (key system)

The Next Generation Traffic Flow Management (NG-TFM) system provides an array of automation and data processing tools for Traffic Management Specialists (TMS) and Traffic Management Coordinators (TMC), as well as a gateway that enables NAS users to make changes in flight schedules based on planned traffic initiatives (e.g., Ground Delay Programs) and other NAS data. This enhanced decision support system provides increased information exchange between FAA service providers and NAS users. NG-TFM receives flight schedules from NAS users (e.g., air carriers) and combines these with weather data, NAS status data, and planned traffic initiatives to generate detailed graphical and textual traffic displays as far as 24 hours into the future on both national and local scales. Features include both pre-flight and post-flight analysis tools, flight data archiving, enhanced traffic displays, traffic strategy (one or more initiatives) automation, "what if" strategy analysis, and automated TFM training tools.

NG-TFM is comprised of five different software component systems and will include a hardware and operating system software tech refresh. The complete NG-TFM software package includes changes to support interfaces with the Flight Object Management System (FOMS) and System Wide Information Management (SWIM). When complete, this will establish a new NG-TFM system baseline.

Radio Control Equipment

Radio Control Equipment (RCE), located at both ATC facilities and remote communication sites, control the operation of remotely located ground to air Very High Frequency/Ultra High Frequency (VHF/UHF) radios used by air traffic controllers to communicate with pilots. RCE interfaces with the voice switch at the ATC facility, telephone landlines, and ground to air radios at the En Route Remote Communications Air/Ground (RCAG) sites, Terminal Remote Transmitter/Receiver (RTR) sites, and Flight Service Station Remote Communications Outlet (RCO) sites.

Satellite Communication Ground Radios

Satellite Communications (SATCOM) Ground Radios are transceivers installed at oceanic and en route facilities to support an alternative means of tactical air traffic control (ATC) voice communications between ground controllers and pilots in aircraft. These transceivers are typically used in transoceanic applications. These transceivers are also installed at regional facilities and used as an alternate means of communications in case of total ground communications failure or between locations in mountainous terrain or where other means of communications are not possible (e.g., Alaska).

Oceanic air to ground satellite communications are provided via a communications service provider. The FAA currently has no plans to develop or implement its own air to ground SATCOM ground radios.

Standard Automation Platform Convergence Phase 1 (key system)

The purpose of Standard Automation Platform Convergence Phase 1 (SAP Conv P1) is to reduce both procurement and recurring costs by standardizing and sharing as many hardware and software ATC Automation components as possible.

An engineering convergence task will begin in fiscal year 2005 and run through 2015. All components from each of the automation systems (STARS, ERAM, TFM, etc.) will be analyzed, and the "best of breed" and "core" components will be selected. SAP convergence will be performed in the following areas: (1) Hardware; (2) System Software (operating systems, Commercial-Off-The-Shelf tools, etc.); (3) ATC applications that can be shared across domains; (4) ATC applications that are unique to a domain; and (5) ATC system support tools that can be shared across domains (adaptation, data extraction or systems analysis recording, data reduction and analysis tools, etc.). Proven STARS and ERAM components will be slected, integrated into the SAP, and rigorously tested for replacing STARS and ERAM components at or near their end of service life.

Prototyping begun under Phase 1 will continue with SAP Conv P2. The results of both efforts will lead to refining the requirements to develop the SAP WS mechanism with SDP and FOMS applications.

Standard Automation Platform Remote Workstation Phase 1 (key system)

The SAP RW provides the controller in the tower and the specialist in Flight Advisory Services an interface to the Flight Object Management System and Surveillance Data Processor. The workstation additionally provides the tower controller a display of arrival/departure surveillance data.

Standard Automation Platform Workstation Phase 1 (key system)

The SAP consists of the Flight Object Management System (FOMS), the Surveillance Data Processor (SDP), and the SAP Workstation. The SAP will be installed in En Route and Arrival/Departure facilities. The SDP performs surveillance data processing and tracking on Surveillance Data Objects received from the Surveillance Data Network. The FOMS performs flight plan processing, associates flight and track data, and publishes the Flight Object on the System Wide Information Management network. The SAP workstation provides the controller interface for the FOMS and SDP.

Surface Traffic Information Processor

The STIP would be an extension of the Automatic Dependent Surveillance-Broadcast (ADS-B)/Traffic Information Service - Broadcast (TIS-B) capability at 60 large airports equipped with Airport Surface Detection Equipment (ASDE) Model X or Model 3 systems. A processor would be added at each of these airports to support Traffic Information Service-Broadcast (TIS-B) services for surface and nearby low-altitude traffic. The STIP will receive surveillance information from the ASDE-X or ASDE-3 system and generate TIS-B messages for delivery by the Broadcast Services Ground Stations (BSGSs) providing surface coverage at that airport. The STIP will support of subset of the functionality of the TIS-FIS Broadcast Server (that is intended to support TIS-B for airborne users), but the STIP will support a more real-time TIS-B service with a higher update rates and lower latency consistent with the available surface surveillance data source and the needs to support surface movement operations.

Surveillance Data Network (key system)

National Airspace System (NAS) surveillance systems, including radar and automatic dependent surveillance systems will provide surveillance data objects via the Surveillance Data Network (SDN), which is a sub-network of the System Wide Information Management (SWIM) and the FAA Telecommunication Infrastructure (FTI). The published Surveillance Data Objects (SDO) will be made available to NAS and other users, including the Transportation Security Administration, Department of Defense, and others. Surveillance data availability supports 3-mile separation standards, gate-to-gate traffic management, seamless airspace, and dynamic resectorization. Improved surveillance information is provided in a timely and consistent manner seamlessly across the NAS for operations, planning, and decision making. The information will be available to all users and service providers via SDO in near real time. This information enables decisions to be based on a shared common view of situations, even as conditions are changing. Improved surveillance with SDOs will provide the automation higher quality of data for seamless surveillance and, in combination with other capabilities and new procedures, enable capacity and safety improvements. These benefits accrue from increased situation awareness by decision makers and improved operation of decision support and analysis tools that use surveillance information.

Surveillance Data Processor (key system)

SDP is a component of SAP and operates in En Route and Terminal. The SDP will make improvements to sensors and automation systems that will allow for expanded use of 3-mile separation and terminal procedures. The operational improvements enable more efficient control of aircraft and use of airspace. To accomplish this, all 1030/1090 Beacon interrogators will be upgraded to disseminate their existing 1.2 milli-radian azimuth accuracy and other information, such as time of measurement, confidence, quality, and so on. The automation system algorithms will be improved or new algorithms will be developed to exploit the additional information content of the improved surveillance reports. The method of presentation (display) to support 3-mile separation will be developed and tested to ensure safety. The existing long-range sensor surveillance update period is (12 seconds) and is insufficient to support 3-mile separation. In areas where only long-range sensors exist and where the Air Traffic Service requires 3-mile separation, these sensors may be modified to double the update rate to achieve 3-mile separation.

System Wide Information Management Build 1B (key system)

Build 1B provides all items in 1A, including more NAS information. This build integrates Flight and Surveillance Information systems into the SWIM architecture.

TIS-FIS Broadcast Server (key system)

TIS-FIS Broadcast Servers are located at 22 Air Route Traffic Control Centers and 8 consolidated Terminal Radar Approach Controls/Integrated Control Complex (ICC). TIS-Broadcast (TIS-B) is needed unless full Automatic Dependent Surveillance-Broadcast equipage is achieved. Servers will receive surveillance data (i.e., based on Secondary Surveillance Radar, etc.), from the Surveillance Data Processor (SDP), in the form of Surveillance Data Objects for each target aircraft and will create TIS-B reports. Servers will receive FIS data from weather processors. The TIS and FIS data will be geographically filtered for the defined service volume of each Broadcast Services Ground Station (BSGS), and TIS data will also be filtered for only non-ADS-B-equipped targets.

Ultra High Frequency Airborne Radios

The Ultra High Frequency Avionics (UHF Avionics) are analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225-400 MHz frequency band, which are multi-channel transceivers, installed in an airborne military platform. These airborne devices support the tactical two-way voice communications/ coordination between the military pilot in the military aircraft and the controller on the ground.

Ultra High Frequency Ground Radios - Replacement

The Ultra High Frequency Ground Radios - Replacement (UHF Ground Radios - Repl) mechanism represents analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 MHz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and Flight Service Station domains.

Very High Frequency Ground Radios

Very High Frequency (VHF) Ground Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 MHz frequency band which are single-channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the pilot in commercial, cargo, or general aviation aircraft in the oceanic, en route (i.e., ARTCC), terminal (i.e., TRACON/tower), and flight service station domains. Additionally, there are analog VHF frequency modulation (VHF - FM) radio devices operating in the 161 - 174 MHz frequency band that are multi-channel transceivers. These transceivers are used by flight inspection, aviation security, and airway facility specialists supporting local airport operations and maintenance or to perform their operational maintenance mission in support of the NAS. However, these same VHF-FM transceivers are also used to support the resolution of emergency situations or establish a level of voice command and control communications/coordination during disaster recovery.

Very High Frequency Mobile Radios

Very High Frequency (VHF) Mobile Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 Mhz frequency band which are multi-channel transceivers installed in surface vehicles (e.g., "follow-me," maintenance, administrative, and snow-removal vehicles). These devices support the tactical two-way voice communications/coordination between the operators in the vehicles and the tower controllers or airline operations personnel.

Support Activities

FAA Adaptation for Provide Surface Situation to Pilots Service Providers and Vehicle Operators for All-weather Surface Operations

Many NAS systems incorporate parameters that are adjustable. This allows for the setting of system parameters to optimize performance at each particular site. When new systems that have adjustable parameters are introduced into the NAS, adaptation data must be developed for the system. Environmental and procedural changes may also result in the need to modify FAA Adaptation Data. Generally, adaptation will begin 12 months before IOC and continue until 12 months after IOC.

FAA Airspace Design for Provide Surface Situation to Pilots Service Providers and Vehicle Operators for All-weather Surface Operations

FAA Airspace Design provides the aviation community the description, operational composition, and status of airspace/airport components of the NAS. Generally, airspace design begins six months prior to Initial Operating Capability.

FAA Certification for Provide Surface Situation to Pilots Service Providers and Vehicle Operators for All-weather Surface Operations

FAA certification is an activity necessary to support people and systems in the delivery of NAS services. Avionics and associated systems are deemed to be critical to the safety of flight and must be certificated. In addition certain operators and service providers require to be certified such as pilots, dispatchers and others. Certification will generally begin 24 months prior to Initial Operating Capability, and be complete prior to receiving or giving service.

FAA Rulemaking for Provide Surface Situation to Pilots Service Providers and Vehicle Operators for All-weather Surface Operations

FAA Rulemaking is necessary when Federal Air Regulations require or change the delivery of NAS services. The regulatory process must be complete prior to implement or service provision. The lead time for change vary greatly due to the varieties of scope but will take a minimum of 180 days before implemented.

FAA Spectrum Engineering for Provide Surface Situation to Pilots Service Providers and Vehicle Operators for All-weather Surface Operations

FAA Spectrum Engineering ensures that radio frequency spectrum is available before developing or procuring new communications-electronics systems.

FAA Standards for Provide Surface Situation to Pilots Service Providers and Vehicle Operators for All-weather Surface Operations

FAA standards development is an activity necessary to support people and systems in the delivery of NAS services. FAA Standards establish rules for the measure of quantity, weight, extent, value, or quality.

Non-FAA Certification for Provide Surface Situation to Pilots Service Providers and Vehicle Operators for All-weather Surface Operations

FAA standards are applied to user activities necessary to support people and systems in the delivery of NAS services. Aviation avionics and equipment is deemed to be critical to the safety of flight and must be certificated. It is also necessary to certify aviation personnel compliance with these standards. Certification will generally begin 24 months prior to Initial Operating Capability, and be complete prior to receiving service.

Non-FAA Pilot Procedure Development for Provide Surface Situation to Pilots Service Providers and Vehicle Operators for All-weather Surface Operations

A number of NAS users document the way their activities are to be carried out. The introduction of new systems, or changes to existing systems may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development will generally begin once ATC procedures have been established and be complete by 90 days prior to Initial Operating Capability, in order to facilitate training.

Non-FAA Pilot Training for Provide Surface Situation to Pilots Service Providers and Vehicle Operators for All-weather Surface Operations

Non-FAA Pilot Training is provided to educate pilots as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional pilot training. Training will generally begin 60 days prior to IOC and be complete within one year following Full Operating Capability.

Non-FAA Procedure Development for Provide Surface Situation to Pilots Service Providers and Vehicle Operators for All-weather Surface Operations

A number of NAS users document the way their activities are to be carried out. The introduction of new systems, or changes to existing systems may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development will generally begin once ATC procedures have been established and be complete by 90 days prior to Initial Operating Capability, in order to facilitate training.

Non-FAA Training for Provide Surface Situation to Pilots Service Providers and Vehicle Operators for All-weather Surface Operations

Non-FAA Training is provided to educate users and their workforces as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional pilot training. Training will generally begin 60 days prior to IOC and be complete within one year following Full Operating Capability.

People

Ground Controller

A Ground Controller performs the following activities: Ensure separation; Control vehicles as well as aircraft on movement areas other than active runways Initiate control instructions; Monitor and operate communications equipment; Utilize tower radar display(s); Utilize alphanumerics; Assist the tower associate controller with coordination; Scan tower cab environment; Ensure computer entries and strip marking are completed for instructions or clearances issued or received; Process and forward flight plan information; Perform any functions of the tower team which will assist in meeting situation objectives; Coordinate with local control for safe and efficient use of runways and movement areas.

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Surface Vehicle Operator

Ground personnel operate vehicles on the airport surface to support aircraft service, maintenance and other operations. Ground, local, or ramp controllers may provide separation from other ground traffic (aircraft or vehicles) at controller airports. Pilots and ground personnel work together to ensure safe movement of aircraft at all airports.

Interfaces

Aeronautical Information Management — (Data Communication) → Integrated Information Workstation - Build 1

AIM sends NOTAMS and other data to the IIW for display.

Aeronautical Information Management ← (NAS Status Data) → System Wide Information Management Build 1B

"AIM exchanges NAS Status data, including equipment status, airspace schedules and status, contingency routings, and RNP-RNAV routings, with other systems via SWIM.

Aeronautical Information Management — (Weather Data) → System Wide Information Management Build 1B

AIM provides PIREPS for distribution to NAS users via SWIM.

BSGS Broadcast Services Ground Station — (Surveillance Data) → System Wide Information Management Build 1B

The GBT provides ADS-B reports to the SDN for distribution to automation systems and other authorized systems and user.

BSGS Broadcast Services Ground Station ← (Target Data) → TIS-FIS Broadcast Server

The TIS-FIS Broadcast Server exchanges data with the BSGS to form a surveillance broadcast reports, which are then broadcasted to users via the BSGS.

Communications Management System ← (Data Communication) → Communications Management System

Controllers in the same or different facilities communicate via CMS.

Communications Management System ← (Voice Communication) → Communications Management System

Controllers in the same or different facilities communicate via CMS.

Flight Object Management System - Terminal — (Flight Data) → BSGS Broadcast Services Ground Station

FOMS sends flight data to the GBT for broadcast to aircraft.

Flight Object Management System - Terminal ← (Data Communication) → Integrated Information Workstation - Build 1

FOMS sends traffic management decision support tool information to IIW. IIW serves as the controller interface to the tools.

Flight Object Management System - Terminal ← (Flight Data) → Next Generation Traffic Flow Management

FOMS and NG-TFM exchange flight data.

Flight Object Management System - Terminal ← (Flight Data) → Standard Automation Platform Remote Workstation Phase 1

FOMS exchanges flight plan data with the SAP RW.

Flight Object Management System - Terminal — (Flight Data) → Standard Automation Platform Workstation Phase 1

FOMS provides the flight object to the SAP WS for display to the controller.

General Weather Processor — (Weather Data) → System Wide Information Management Build 1B

GWP provides weather data to SWIM for distribution to users.

General Weather Processor — (Weather Data) → TIS-FIS Broadcast Server

GWP provides graphical weather information to the TIS-FIS Broadcast Server for processing pior to being sent to the BSGS for broadcasting.

National Airspace System Infrastructure Management System Phase 2 ← (NAS Status Data) → National Airspace System Infrastructure Management System Phase 2

The NIMS master systems interfaces with the NIMS client systems to share files, monitor messages and allow communications between maintenance data terminals anywhere within the NIMS network.

National Airspace System Infrastructure Management System Phase 2 — (NAS Status Data) → System Wide Information Management Build 1B

"NIMS provides equipment status data to SWIM for distribution to systems, including, AIM, FOMS, and the IIW, and users, including the AOC.

Next Generation Traffic Flow Management — (NAS Status Data) → Communications Management System

NG-TFM determines the best use of NAS resources and directs CMS to reconfigure communication resources accordingly.

Next Generation Traffic Flow Management — (Data Communication) → Integrated Information Workstation - Build 1

NG-TFM provides traffic flow management data to the IIW for display to controllers.

Next Generation Traffic Flow Management ← (Data Communication) → System Wide Information Management Build 1B

NG-TFM exchanges strategic flow data via SWIM.

Surveillance Data Processor — (Surveillance Data) → BSGS Broadcast Services Ground Station

The SDP provides surveillance data for aircraft that are not responding to beacon interrogations or providing ADS-B reports to the GBT for transmission up both the UAT and 1090 links.

Surveillance Data Processor — (Track Data) ➔ Flight Object Management System - Terminal
SDP sends correlated surveillance data to FOMS for further processing, including association with flight data.
Surveillance Data Processor — (Track Data) ➔ Standard Automation Platform Remote Workstation Phase 1
The SDP provides track data to the SAP RW for display to tower controllers.
Surveillance Data Processor — (Surveillance Data) ➔ Standard Automation Platform Workstation Phase 1
The SDP sends surveillance data to the SAP WS for display to the controller.
Surveillance Data Processor — (Surveillance Data) ➔ TIS-FIS Broadcast Server
Surveillance data reports from the SDP, in the form of surveillance data objects, are sent to the TIS-FIS Broadcast Server to be geographically filtered for the defined service volume of each Broadcast Services Ground Station.
System Wide Information Management Build 1B — (Flight Data) ➔ BSGS Broadcast Services Ground Station
FOMS provides the flight object to the GBT for transmission to aircraft via SWIM.
System Wide Information Management Build 1B — (NAS Status Data) ➔ BSGS Broadcast Services Ground Station
"The GBT receives NAS Status Data, including NOTAMS, via SWIM for broadcast to aircraft equipped with UAT communication equipment.
System Wide Information Management Build 1B — (Data Communication) ➔ Communications Management System
Pilots can access data available on SWIM via radios and CMS.
System Wide Information Management Build 1B — (NAS Status Data) ➔ Flight Object Management System - Terminal
FOMS receives NAS status data via SWIM.
System Wide Information Management Build 1B — (Weather Data) ➔ Flight Object Management System - Terminal
FOMS receives weather products from GWP and other sources via SWIM.
System Wide Information Management Build 1B — (Flight Data) ➔ Next Generation Traffic Flow Management
NG-TFM receives flight object data via SWIM.
System Wide Information Management Build 1B — (NAS Status Data) ➔ Next Generation Traffic Flow Management
"NG-TFM receives NAS status data, including airspace changes and oceanic constraints, via SWIM.
System Wide Information Management Build 1B — (Weather Data) ➔ Next Generation Traffic Flow Management
NG-TFM receives weather advisory data via SWIM.
System Wide Information Management Build 1B — (Weather Data) ➔ Standard Automation Platform Workstation Phase 1
The SAP WS receives weather data from SWIM for display to controllers.
System Wide Information Management Build 1B — (Surveillance Data) ➔ Surveillance Data Processor
The SDN distributes surveillance data received from various sensors to NAS automation systems.
TIS-FIS Broadcast Server — (Weather Data) ➔ BSGS Broadcast Services Ground Station
FIS graphical weather products from the TIS-FIS Broadcast Server are sent to the BSGS for broadcasting.

Issues

Requires substantial equipage to exercise the capability. Requires certification of CDTI, with moving map and target positions for taxiing and maintaining separation along the taxiways. Requires certification of surveillance and controller displays for maintaining runway separation.

Service Group Air Traffic Services
Service Airspace Management
Capability Airspace Design
Operational Improvement

Current Airspace Design (108101)

Airspace designs consider, among other elements, the existing design, current and projected traffic usage, radio frequency congestion, effects of airport construction, proposed and existing surface structures, and environmental factors, such as noise abatement. Airspace designs provide the aviation community the description, operational composition, and status of airspace/airport components of the NAS required to support separation and synchronization services.
01-Jan-1990 to 02-Feb-2015

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Current airspace designs have evolved over time and provide the basis:

·Designating airspace volumes Class A-G based on the level of service and aircraft capability requirements.

·Assignment of volumes airspace to service providers for the provision of separation and traffic advisories, e.g. sectors.

·The evaluation and designation of hazards such as terrain, obstacles, phenomena.

·The establishment of waypoints and route structures to provide for flow across the nation including the interplay with navigation to provide signal in space.

·Guidelines for designating, on a dynamic basis, airspace for military operations, security, special events, etc.

·Guidelines for assuring required communications, navigation and surveillance coverage in the design

Benefits

Current operations are provided in the NAS.

Systems

Airspace Simulation and Analysis for Terminal Procedures (TERPS) (ASAT) (key system)
ASAT is the primary simulation facility in use today for the development of standards and criteria, risk analyses, and complex modeling and analysis work by the Flight Standards Service and other FAA agencies.
Sector Design Analysis Tool (SDAT) (key system)

SDAT is an analytic tool that evaluates changes in airspace design and traffic routing. SDAT is a component of the SDAT Enterprise, an FAA-owned decision support tool for analysis and design of airspace and traffic flows. Its primary focus is supporting the activities undertaken by FAA airspace offices at local, regional, and national levels. SDAT applications include airspace visualization, traffic flow analysis, and model integration. The SDAT Enterprise tool suite currently consists of three components: SDAT, the high-end visualization and analysis tool; SDAT Construct, for data and project management; and AT Vista, an ATC display emulator.

Terminal Area Route Generation Evaluation and Traffic Simulation (TARGETS) (key system)

TARGETS is used in procedure development to overlay RNAV routes on existing airspace. TARGETS can simulate aircraft flying the procedure with existing traffic flows and evaluate flyability of a proposed procedure.

People

Aeronautical Charts and Supplements Publication People

The charting of the new airspace and air routes are performed by the FAA National Aeronautical Charting Office. This organization coordinates with the Regional Airspace Manager to publish and distribute aeronautical charts and procedures associated with a newly approved airspace and/or air routes.

Airspace Design Team

The Airspace Design Team maybe made up of personnel from the affected facility(ies), regional personnel, FAA Headquarters personnel, and stakeholders. If airspace controlled by or shared with other government organizations is involved, then that government organization should be represented on the Airspace Design Team. The Airspace Design Team should include or have access to environmental expertise to identify and assist with environmental assessments as required. The Airspace Design Team is responsible for establishing a study charter and conducting the airspace study.

Airspace Liaison Team

The Airspace Liaison Team is composed of the regional airspace branch managers, their National Air Traffic Controllers Association (NATCA) counterparts and FAA Headquarters personnel. The Airspace Liaison Team was created to provide the forum within which the FAA will develop a consensus regarding airspace management issues and activities. This group strives for the following: (1) To establish unity with interested parties and (2) To provide a forum for communicating concerns. The Airspace Liaison Team emphasizes the use of the power of combined experience to derive workable solutions regarding the use of national airspace.

Regional Airspace Manager

The Regional Airspace Manager is responsible for assessing the initial evaluation of proposed airspace changes and coordinating with ATA-200. If needed the regional airspace manager will establish an airspace design team that will be responsible for conducting the airspace study.

Interfaces

no interfaces

Issues

none identified

Service Group Air Traffic Services

Service Airspace Management

Capability Airspace Design

Operational Improvement

Improve Airspace Design using Additional Criteria (108102)

Airspace design criteria are based on altitudes as measured by space-based navigation support. Criteria for airspace structures are developed based on the capability of aircraft to accurately fly and maintain these "true" earth altitudes versus pressure altitude. While pressure altitudes will remain the efficient choice in higher altitude cruise, in many lower altitude situations the airspace structures will be based on the space-based capability of the aircraft and the relationship to separation criteria.

01-Jan-1990 to 02-Feb-2015

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Airspace design criteria are based on altitudes as measured by space-based navigation support. Criteria for airspace structures are developed based on the capability of aircraft to accurately fly and maintain these "true" earth altitudes versus pressure altitude. While pressure altitudes will remain the efficient choice in higher altitude cruise, in many lower altitude situations the airspace structures will be based on the space-based altimeter capability of the aircraft and the relationship to separation criteria.

Benefits

Removing reliance on barometric-altitude capabilities in establishing airspace structures for avoidance of terrain and obstacles, approach minima, etc. while allowing for more direct routings in both the horizontal and vertical plane

Systems

Airspace Simulation and Analysis for Terminal Procedures (TERPS) (ASAT) (key system)

ASAT is the primary simulation facility in use today for the development of standards and criteria, risk analyses, and complex modeling and analysis work by the Flight Standards Service and other FAA agencies.

Sector Design Analysis Tool (SDAT) (key system)

SDAT is an analytic tool that evaluates changes in airspace design and traffic routing. SDAT is a component of the SDAT Enterprise, an FAA-owned decision support tool for analysis and design of airspace and traffic flows. Its primary focus is supporting the activities undertaken by FAA airspace offices at local, regional, and national levels. SDAT applications include airspace visualization, traffic flow analysis, and model integration. The SDAT Enterprise tool suite currently consists of three components: SDAT, the high-end visualization and analysis tool; SDAT Construct, for data and project management; and AT Vista, an ATC display emulator.

Terminal Area Route Generation Evaluation and Traffic Simulation (TARGETS) (key system)

TARGETS is used in procedure development to overlay RNAV routes on existing airspace. TARGETS can simulate aircraft flying the procedure with existing traffic flows and evaluate flyability of a proposed procedure.

Support Activities

AT Procedure Development for Future Airspace Design

Air Traffic Procedures document air traffic services and how they are implemented. The introduction of new systems, or changes to existing systems, may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

AT Training for Future Airspace Design

Air Traffic (AT) training is provided to the AT workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AT Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

FAA Airspace Design for Future Airspace Design

FAA Airspace Design provides the aviation community the description, operational composition, and status of airspace/airport components of the NAS. Generally, airspace design begins six months prior to Initial Operating Capability.

FAA Flight Check for Future Airspace Design

FAA Flight Check is an activity necessary to certify navigational aids required to deliver NAS services. Flight checks ensure that performance standards are met and are completed up to 90 days before Initial Operating Capability to insure safety.

FAA Rulemaking for Future Airspace Design

FAA Rulemaking is necessary when Federal Air Regulations require or change the delivery of NAS services. The regulatory process must be complete prior to implement or service provision. The lead time for change vary greatly due to the varieties of scope but will take a minimum of 180 days before implemented.

FAA Spectrum Engineering for Future Airspace Design

FAA Spectrum Engineering ensures that radio frequency spectrum is available before developing or procuring new communications-electronics systems.

Non-FAA Pilot Procedure Development for Future Airspace Design

A number of NAS users document the way their activities are to be carried out. The introduction of new systems, or changes to existing systems may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development will generally begin once ATC procedures have been established and be complete by 90 days prior to Initial Operating Capability, in order to facilitate training.

Non-FAA Pilot Training for Future Airspace Design

Non-FAA Pilot Training is provided to educate pilots as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional pilot training. Training will generally begin 60 days prior to IOC and be complete within one year following Full Operating Capability.

People

Aeronautical Charts and Supplements Publication People

The charting of the new airspace and air routes are performed by the FAA National Aeronautical Charting Office. This organization coordinates with the Regional Airspace Manager to publish and distribute aeronautical charts and procedures associated with a newly approved airspace and/or air routes.

Airspace Design Team

The Airspace Design Team maybe made up of personnel from the affected facility(ies), regional personnel, FAA Headquarters personnel, and stakeholders. If airspace controlled by or shared with other government organizations is involved, then that government organization should be represented on the Airspace Design Team. The Airspace Design Team should include or have access to environmental expertise to identify and assist with environmental assessments as required. The Airspace Design Team is responsible for establishing a study charter and conducting the airspace study.

Airspace Liaison Team

The Airspace Liaison Team is composed of the regional airspace branch managers, their National Air Traffic Controllers Association (NATCA) counterparts and FAA Headquarters personnel. The Airspace Liaison Team was created to provide the forum within which the FAA will develop a consensus regarding airspace management issues and activities. This group strives for the following: (1) To establish unity with interested parties and (2) To provide a forum for communicating concerns. The Airspace Liaison Team emphasizes the use of the power of combined experience to derive workable solutions regarding the use of national airspace.

Regional Airspace Manager

The Regional Airspace Manager is responsible for assessing the initial evaluation of proposed airspace changes and coordinating with ATA-200. If needed the regional airspace manager will establish an airspace design team that will be responsible for conducting the airspace study.

Interfaces

no interfaces

Issues

none identified

Service Group Air Traffic Services

Service Airspace Management

Capability Airspace Design

Operational Improvement

Provide Design Criteria for Airspace Flight Objects (108104)

All uses of airspace evolve from the current reservation system to a common flight plan/profile for all uses. Thus a special use airspace (SUA) activity would include the time duration and volume of airspace around the trajectory required to execute the mission. This improvement acknowledges the increased requirement for dynamic airspace restrictions with variable separation for security, military operations, Remotely Operated Aircraft, (ROA), and reusable launch vehicles, (RLV). The activity to control the entry into the system of such profiles remains an airspace function, but the actual management of the data becomes united with the flight processing system.

01-Jan-1990 to 02-Feb-2015

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Airspace for special use is designed and delegated on a dynamic basis. The airspace is assigned to meet the operational needs of the requester but takes into consideration the expected demand and flow patterns of the day. Historically, Special

Use Airspaces (SUA) were designed and airspace was assigned between the normal air traffic flows where the flows were fixed, based on the dominant annual patterns. The same philosophy is employed but on a more dynamic basis with assignments made as part of long-term strategic flow planning and then adjusted up to the day of flight. The advance is in flight data management and increased flexibility in reconfiguring airspace allows this fuller flexibility in SUA management.

There are changes in the manner in which the airspace is scheduled and users notified. All uses of airspace evolve from the current reservation system to a common flight plan/profile for all uses. Thus an SUA activity would include the time duration and volume of airspace around the trajectory required to execute the mission. SUA's acknowledge the increased requirement for dynamic airspace restrictions with variable separation for security, military operations, Remotely Operated Aircraft, and reusable launch vehicles. The activity to control the entry into the system of such profiles remains an airspace function, but the actual management of the data becomes united with the flight processing system.

Benefits

By assigning airspace that minimizes impact interaction with the expected flow, fewer flights will be subject to the SUA airspace constraint. Second, for those flights still subject to the constraints, the limitations on access to airspace for most efficient routings are reduced. This includes accurate understanding of the schedule for the airspace, but by managing the scheduling in the Flight Object Management System, (FOMS), the auto-notification future to changes in constraints is available as well as alternative flight profiles that use the airspace if available.

Systems

Airspace Simulation and Analysis for Terminal Procedures (TERPS) (ASAT) (key system)

ASAT is the primary simulation facility in use today for the development of standards and criteria, risk analyses, and complex modeling and analysis work by the Flight Standards Service and other FAA agencies.

Flight Object Management System - En Route

The FOMS is a component of the Standard Automation Platform (SAP). The FOMS processes flight data received from multiple sources via the System Wide Information Management (SWIM) Management Unit. The FOMS also receives track data from the Surveillance Data Processor and associates tracks with flight data, producing the flight object, which is published to SWIM for subscriber use. Flight plan support functionality includes end-to-end profile evaluation in all phases of flight and evaluation against static and dynamic constraints (terrain, obstacles, airspace restrictions, etc.). The FOMS supports flight planning up to 180 days prior to day of flight. A user can access the flight object from initial to closeout in the same manner. The FOMS provides end-to-end flight data management from preflight to post analysis. Ownership of the flight object begins and ends with Traffic Flow Management and transitions during the flight to clearance delivery, ramp, surface, departure, transition to cruise, cruise, transition to arrival, and ramp. Flight data management is based on trajectory, assigned volumes, and "necessary" route structure.

Flight Object Management System - Terminal

The FOMS is a component of the Standard Automation Platform (SAP). The FOMS processes flight data received from multiple sources via the System Wide Information Management (SWIM) Management Unit. The FOMS also receives track data from the Surveillance Data Processor (SDP) and associates tracks with flight data, producing the flight object, which is published to SWIM for subscriber use. Flight plan support functionality includes end-to-end profile evaluation in all phases of flight and evaluation against static and dynamic constraints (terrain, obstacles, airspace restrictions, etc.). The FOMS supports flight planning up to 180 days prior to day of flight. A user can access the flight object from initial to closeout in the same manner. The FOMS provides end-to-end flight data management from preflight to post analysis. Ownership of the flight object begins and ends with Traffic Flow Management and transitions during the flight to clearance delivery, ramp, surface, departure, transition to cruise, cruise, transition to arrival, and ramp. Flight data management is based on trajectory, assigned volumes, and "necessary" route structure.

Next Generation Traffic Flow Management

The Next Generation Traffic Flow Management (NG-TFM) system provides an array of automation and data processing tools for Traffic Management Specialists (TMS) and Traffic Management Coordinators (TMC), as well as a gateway that enables NAS users to make changes in flight schedules based on planned traffic initiatives (e.g., Ground Delay Programs) and other NAS data. This enhanced decision support system provides increased information exchange between FAA service providers and NAS users. NG-TFM receives flight schedules from NAS users (e.g., air carriers) and combines these with weather data, NAS status data, and planned traffic initiatives to generate detailed graphical and textual traffic displays as far as 24 hours into the future on both national and local scales. Features include both pre-flight and post-flight analysis tools, flight data archiving, enhanced traffic displays, traffic strategy (one or more initiatives) automation, "what if" strategy analysis, and automated TFM training tools.

NG-TFM is comprised of five different software component systems and will include a hardware and operating system software tech refresh. The complete NG-TFM software package includes changes to support interfaces with the Flight Object Management System (FOMS) and System Wide Information Management (SWIM). When complete, this will establish a new NG-TFM system baseline.

Sector Design Analysis Tool (SDAT) (key system)

SDAT is an analytic tool that evaluates changes in airspace design and traffic routing. SDAT is a component of the SDAT Enterprise, an FAA-owned decision support tool for analysis and design of airspace and traffic flows. Its primary focus is supporting the activities undertaken by FAA airspace offices at local, regional, and national levels. SDAT applications include airspace visualization, traffic flow analysis, and model integration. The SDAT Enterprise tool suite currently consists of three components: SDAT, the high-end visualization and analysis tool; SDAT Construct, for data and project management; and AT Vista, an ATC display emulator.

Standard Automation Platform Workstation Phase 1

The SAP consists of the Flight Object Management System (FOMS), the Surveillance Data Processor (SDP), and the SAP Workstation. The SAP will be installed in En Route and Arrival/Departure facilities. The SDP performs surveillance data processing and tracking on Surveillance Data Objects received from the Surveillance Data Network. The FOMS performs flight plan processing, associates flight and track data, and publishes the Flight Object on the System Wide Information Management network. The SAP workstation provides the controller interface for the FOMS and SDP.

System Wide Information Management Build 1B

Build 1B provides all items in 1A, including more NAS information. This build integrates Flight and Surveillance Information systems into the SWIM architecture.

Terminal Area Route Generation Evaluation and Traffic Simulation (TARGETS) (key system)

TARGETS is used in procedure development to overlay RNAV routes on existing airspace. TARGETS can simulate aircraft flying the procedure with existing traffic flows and evaluate flyability of a proposed procedure.

Support Activities

AT Procedure Development for Design Criteria for Airspace Flight Objects

Air Traffic Procedures document air traffic services and how they are implemented. The introduction of new systems, or changes to existing systems, may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

AT Training for Design Criteria for Airspace Flight Objects

Air Traffic (AT) training is provided to the AT workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AT Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

FAA Adaptation for Design Criteria for Airspace Flight Objects

Many NAS systems incorporate parameters that are adjustable. This allows for the setting of system parameters to optimize performance at each particular site. When new systems that have adjustable parameters are introduced into the NAS, adaptation data must be developed for the system. Environmental and procedural changes may also result in the need to modify FAA Adaptation Data. Generally, adaptation will begin 12 months before IOC and continue until 12 months after IOC.

FAA Airspace Design for Design Criteria for Airspace Flight Objects

FAA Airspace Design provides the aviation community the description, operational composition, and status of airspace/airport components of the NAS. Generally, airspace design begins six months prior to Initial Operating Capability.

FAA Certification for Design Criteria for Airspace Flight Objects

FAA certification is an activity necessary to support people and systems in the delivery of NAS services. Avionics and associated systems are deemed to be critical to the safety of flight and must be certificated. In addition certain operators and service providers require to be certified such as pilots, dispatchers and others. Certification will generally begin 24 months prior to Initial Operating Capability, and be complete prior to receiving or giving service.

FAA Flight Check for Design Criteria for Airspace Flight Objects

FAA Flight Check is an activity necessary to certify navigational aids required to deliver NAS services. Flight checks ensure that performance standards are met and are completed up to 90 days before Initial Operating Capability to insure safety.

FAA Rulemaking for Design Criteria for Airspace Flight Objects

FAA Rulemaking is necessary when Federal Air Regulations require or change the delivery of NAS services. The regulatory process must be complete prior to implement or service provision. The lead time for change vary greatly due to the varieties of scope but will take a minimum of 180 days before implemented.

Non-FAA Certification for Design Criteria for Airspace Flight Objects

FAA standards are applied to user activities necessary to support people and systems in the delivery of NAS services. Aviation avionics and equipment is deemed to be critical to the safety of flight and must be certificated. It is also necessary to certify aviation personnel compliance with these standards. Certification will generally begin 24 months prior to Initial Operating Capability, and be complete prior to receiving service.

Non-FAA Pilot Procedure Development for Design Criteria for Airspace Flight Objects

A number of NAS users document the way their activities are to be carried out. The introduction of new systems, or changes to existing systems may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development will generally begin once ATC procedures have been established and be complete by 90 days prior to Initial Operating Capability, in order to facilitate training.

People

Airspace Design Team

The Airspace Design Team maybe made up of personnel from the affected facility(ies), regional personnel, FAA Headquarters personnel, and stakeholders. If airspace controlled by or shared with other government organizations is involved, then that government organization should be represented on the Airspace Design Team. The Airspace Design Team should include or have access to environmental expertise to identify and assist with environmental assessments as required. The Airspace Design Team is responsible for establishing a study charter and conducting the airspace study.

Airspace Liaison Team

The Airspace Liaison Team is composed of the regional airspace branch managers, their National Air Traffic Controllers Association (NATCA) counterparts and FAA Headquarters personnel. The Airspace Liaison Team was created to provide the forum within which the FAA will develop a consensus regarding airspace management issues and activities. This group strives for the following: (1) To establish unity with interested parties and (2) To provide a forum for communicating concerns. The Airspace Liaison Team emphasizes the use of the power of combined experience to derive workable solutions regarding the use of national airspace.

Regional Airspace Manager

The Regional Airspace Manager is responsible for assessing the initial evaluation of proposed airspace changes and coordinating with ATA-200. If needed the regional airspace manager will establish an airspace design team that will be responsible for conducting the airspace study.

Interfaces

no interfaces

Issues

none identified

Service Group Air Traffic Services

Service Airspace Management

Capability Airspace Management

Operational Improvement

Current Airspace Management (108201)

Current airspace management assigns airspace classification to volumes of airspace. Within those airspaces the service provides develops sectorizations and routings based on the characteristics of the aircraft operating with in those airspace volumes. Airspace Management also reviews construction projects for their impact on airspace, and designates and schedules airspace for special use for activities. Designs are limited by the minimum capabilities of aircraft allowed within a class of airspace and by the limitation of automation and the management/coverage of CNS (communication and navigation systems) assets.
12-Jan-1998 to 31-Dec-2010

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Current airspace management assigns airspace classification to volumes of airspace. Within those airspaces the service provides sectorizations and routings based on the characteristics of the aircraft operating within those airspace volumes. Airspace Management also reviews construction projects for their impact on airspace, and designates and schedules airspace for special use activities. Designs are limited by the minimum capabilities of aircraft allowed within a class of airspace and by the limitation of automation and the management/coverage of Communications, Navigation, and Surveillance (CNS) assets.

Benefits

Current operations are provided in the NAS.

Systems

Automated Radar Terminal System - Model IIE

The Automated Radar Terminal System - Model IIE (ARTS IIE) provides radar data processing (RDP) and decision support tools to the controller in the terminal environment. Utilized at low to medium-size Terminal Radar Control (TRACONs) Facilities the ARTS IIE is capable of receiving input from up to 2 sensors, can process up to 256 tracks simultaneously, and support up to 22 displays. The ARTS IIE implements the Common ARTS software for improved performance maintenance efficiency. The radar data processing (RDP) software provides automated surveillance tracking and display processing. Included in the ARTS IIE software are decision support tools such as Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Mode C intruder alert, Converging Runway Display Aid (CRDA), and Controller Automation Spacing Aid (CASA).

Automated Radar Terminal System - Model IIIA

The Automated Radar Terminal System - Model IIIA (ARTS IIIA) provides radar data processing (RDP) and decision support tools to the controller in the terminal environment. Utilized at larger airports, ARTS IIIA is capable of receiving input from up to three sensors, can process up to 900 tracks simultaneously and support up to 36 displays. The RDP software provides automated surveillance tracking and display processing. Included in the ARTS IIIA software are decision support tools such as Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Mode C intruder alert, Converging Runway Display Aid (CRDA), Final Monitor Aid (FMA), and controller automation spacing aid.

Automated Radar Terminal System - Model IIIE (key system)

The Automated Radar Terminal System - Model IIIE (ARTS IIIE) consists of the hardware platform and software required providing radar data processing (RDP) and decision support tools to the controller in the terminal environment. The ARTS IIIE is used at consolidated Terminal Radar Approach Control (TRACON) facilities. The Common ARTS program provided an ARTS IIIE capable of receiving input from up to 15 sensors, the ability to process up to 10,000 tracks simultaneously, and support up to 223 displays. The RDP software provides automated surveillance tracking and display processing including mosaic display of radar data. Included in the ARTS IIIE software are decision support tools such as Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Mode C intruder alert, Converging Runway Display Aid (CRDA), Final Monitor Aid (FMA), and controller automation spacing aid.

Host Computer System (key system)

The Host Computer System (HCS) receives and processes surveillance reports, and flight plan information. The HCS sends search/beacon target, track and flight data, surveillance and alphanumeric weather information, time data, traffic management advisories and lists to the (Display System Replacement) DSR. The HCS associates surveillance-derived tracking information with flight-planning information. The DSR sends requests for flight data, flight data updates, and track control messages to the HCS. HCS-generated display orders are translated for use within the DSR workstation. While radar data processing is distributed among the terminal and En Route computer resources, the HCS performs virtually all of the flight data processing for its entire geographical area of responsibility. Every tower (ATCT) and terminal radar approach control (TRACON) relies exclusively on its parent HCS for flight data.

The HCS also runs algorithms that perform aircraft to aircraft (conflict alert) and aircraft to terrain (Minimum Safe Altitude Warning) separation assurance. The HCS algorithms provide visual and audible alerting to the controller when conflicts are identified.

The HCS presently supplies real time surveillance, flight data and other information to several decision support tools housed in collocated outboard processors connected via two-way high bandwidth links to the HCS and DSR. These are the (User Request Evaluation Tool, (URET), and the Traffic Management Advisory (TMA. URET performs probing of tentative flight plan changes to determine their viability. TMA provides sequencing and spacing information to align the aircraft in En Route airspace for approach.

Military Airspace Management System

The Military Airspace Management System (MAMS) is an automated system that schedules and documents Special Use Airspace (SUA) and other related airspace utilization within the DOD. It receives airspace schedule messages (ASM) from local DOD airspace scheduling agencies. The MAMS Central Facility, located at Tinker Air Force Base, Oklahoma, transmits ASMs and utilization data to the FAA Special Use Airspace Management System (SAMS) Central Facility, located at the ATCSCC. The MAMS receives airspace response messages from the SAMS.

Operational and Supportability Implementation System

Operational and Supportability Implementation System (OASIS): The capabilities provided by the OASIS include alphanumeric and graphic weather product acquisition and display, flight plan processing, search and rescue services, and law enforcement support. The OASIS provides a real-time, multi-user, computer-based system that provides current weather information, forecast weather information, Notice to Airmen (NOTAM) information, and flight planning.

OASIS also supports flight service specialists at International Automated Flight Service Stations (IAFSS) that provide services associated with aircraft transiting the oceans.

Special Use Airspace Management System

The Special Use Airspace Management System (SAMS) is an automated system that supports integrated Special Use Airspace (SUA) schedule operations within the FAA and between the FAA and the DOD. The SAMS consists of the SAMS Central Facility (i.e., the SAMS Processor), located at the ATCSCC, and SAMS Workstations located at the ATCSCC, ARTCCs, Towers, TRACONs, and CERAPs. The SAMS Processor receives airspace schedule messages from the Military Airspace Management System (MAMS) Central Facility and transmits them to the SAMS Workstations. The SAMS Processor transmits airspace response messages to the MAMS.

Very High Frequency Omnidirectional Range

The Very High Frequency Omnidirectional Range (VOR) is a ground-based radio navigation aid that broadcasts azimuth information to aircraft. VORs broadcast on assigned channels and include the facility identification in Morse code for pilot monitoring and verification. Some VORs are capable of broadcasting weather information and supporting pilot-controller communcations although these capabilities are typically provided by other infrastructure systems. In addition to providing en route and terminal area azimuth guidance, VORs also support nonprecision instrument approach operations.

Currently, VORs are the primary radio navigation aid in the National Airspace System (NAS). They serve as the internationally designated standard short-distance radio navigation aid for air carrier and general aviation Instrument Flight Rules (IFR) operations.

VORs may be installed stand-alone or co-located with either a DME or TACAN system. When co-located the facility is typically referred to as a VOR/DME or VORTAC facility, respectively. This configuration allows pilots to determine their aircraft''s bearing and distance to a single location, i.e., fix.

With the advent of space-based navigation capabilities, a planned reduction in operational VORs will begin in approximately 2010. The reduction will result in a "backbone" minimum operational network (MON) that will support IFR operations at the busiest airports in the NAS while serving as a backup for space-based navigation.

People

Airspace Design Team

The Airspace Design Team maybe made up of personnel from the affected facility(ies), regional personnel, FAA Headquarters personnel, and stakeholders. If airspace controlled by or shared with other government organizations is involved, then that government organization should be represented on the Airspace Design Team. The Airspace Design Team should include or have access to environmental expertise to identify and assist with environmental assessments as required. The Airspace Design Team is responsible for establishing a study charter and conducting the airspace study.

Airspace Liaison Team

The Airspace Liaison Team is composed of the regional airspace branch managers, their National Air Traffic Controllers Association (NATCA) counterparts and FAA Headquarters personnel. The Airspace Liaison Team was created to provide the forum within which the FAA will develop a consensus regarding airspace management issues and activities. This group strives for the following: (1) To establish unity with interested parties and (2) To provide a forum for communicating concerns. The Airspace Liaison Team emphasizes the use of the power of combined experience to derive workable solutions regarding the use of national airspace.

Regional Airspace Manager

The Regional Airspace Manager is responsible for assessing the initial evaluation of proposed airspace changes and coordinating with ATA-200. If needed the regional airspace manager will establish an airspace design team that will be responsible for conducting the airspace study.

Interfaces

Automated Radar Terminal System - Model IIIE — (Flight Data) → Host Computer System

The ARTS IIIE provides flight data to HCS via PAMRI.

Automated Radar Terminal System - Model IIIE — (Track Data) → Host Computer System

The ARTS IIIE provides surveillance data to HCS via PAMRI.

Issues

none identified

Service Group Air Traffic Services

Service Airspace Management

Capability Airspace Management

Operational Improvement

Expand use of RNAV/RNP Procedures (108203)

Provide airspace design changes to increase access, efficiency and capacity utilization by developing and publishing Area Navigation (RNA) and RNAV Required Navigation Performance (RNP) routings in the NAS. RNAV/RNP provides increased routing to allow more efficient routes of flight and merging of traffic, increased opportunities to manage flow with more defined and closely separated paths. Allows flows that are currently co-mingled due to lateral spacing requirements to be segregated in individual paths.

31-Jul-2011 to 30-Dec-2022

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Airspace design changes provide increased access, efficiency and capacity utilization by developing and publishing Area Navigation (RNAV) Required Navigational Performance (RNP) routings in the National Airspace System (NAS). This capability is supported by the Aeronautical Information Management System for publishing, and En Route Automation Modernization's (ERAM) Flight Data Processor (FDP) with Standard Terminal Automation Replacement System (STARS) for more effective flight data management and display of the routes thus supporting a proliferation of RNAV/RNP routings.

RNAV/RNP provides increased routings to allow more efficient routes of flight and merging of traffic, and increased opportunities to manage flow with more defined and closely separated paths. It allows flows that are currently co-mingled due to lateral spacing requirements to be segregated in individual paths.

RNP is performance-based and not dependent on a specific piece of equipment although the Wide Area Augmentation System (WAAS) and the Local Area Augmentation System (LAAS) greatly expand the areas of use at the higher performance requirements. Rather, RNP is a statement of navigation position accuracy necessary for operation within a defined airspace. RNP is not new hardware for the cockpit or new navigational aids (navaids). "Public implementation of RNP will require combined, coherent application of CNS and ATM technologies that are calibrated to appropriate standards and criteria. Public RNP is defined in terms of types presented in the form RNP-x where x is some fraction or multiple of one nautical mile. Thus RNP-1 refers to the capability of determining (95% of the time) the position of an aircraft accurate to wihin one nautical mile of its actual position." The combined areas will ensure aircraft containment 99.9% of the time (see illustration). Navigation performance for a particular RNP type, or number, is related to the size of an area evaluated for aircraft containment.

A descriptive number attached to RNP (e.g., RNP-2 and RNP-3) can be applied to a large region of airspace or to a unique approach procedure. The value is an indicator of the size of the containment area and also defines how the navigation avionics must operate in that airspace. In the United States, different RNP values can be assigned for terminal approach procedures, departure procedures and en route operations. For instance, terminal area approach procedures require very precise navigation and much smaller containment area (RNP value) within which the aircraft must remain while landing on a particular runway, while en route airspace requires less finite navigation, and therefore larger containment areas to ensure track-to-track separation from other routes.

RNP provides other advances. It permits design of instrument navigation procedures at airports where infrastructure or terrain make it difficult or impossible to design conventional procedures. RNP also allows for improvement to complicated procedures that are demanding on flight crews. By defining real time estimates of navigation certainty, and specifying performance accuracy, flight crews can monitor aircraft trends while the navigation system automatically checks current performance. The system alerts the flight crew when navigation performance is inadequate for an operation.

Benefits

By refining navigation system performance and airspace containment to a 99.999% certainty, maximum benefit can be derived from RNP. The accurate, repeatable paths, and integrity and continuity ensure procedures will be flown in the same manner by all aircraft. Controllers can then expect aircraft to be at a specific position with a high degree of confidence, and thus maximize safety and the efficient flow of aircraft through airspace. This improved containment will be used to refine obstacle evaluation when developing routes and procedures. Other benefits are:

·Reduced route separation resulting in increased airspace capacity and efficiency

·Improved obstacle clearance limits

·Lower landing weather minimums

·Reduced pilot and controller

Systems

Aeronautical Information Management (key system)

The AIM system represents the evolution of the acquisition, storage, processing and dissemination of aeronautical information in the NAS. Aeronautical information is defined as any information concerning the establishment, condition, or change in any component (facility, service, or procedure of, of hazard) of the National Airspace System. Aeronautical information comes in two types a somewhat static type, and a more dynamic type. The static portion represents the aeronautical information baseline as a particular date, while the dynamic portion updates particular aspects of the static portion due to system impacts or events. The Static portion represents data that NAS automation systems and other users use to adapt their software to properly operate. The dynamic portion represents information typically contained in NOTAMs that indicate short-term changes to the static data.

Many NAS systems support the acquisition, generation, and dissemination of the static aeronautical information. Information of this type includes airspace structures, airways, locations of NAS facilities, inter-facility letters of agreement and memorandums of understanding, obstructions, standard procedures, airspace charts, etc.

Several NAS systems also support the acquisition, generation, processing, and dissemination of the dynamic aeronautical information. Information of this type includes, facility outages, runway closures, temporary flight restrictions, airspace constraints, SIGMETs, etc. This information must be disseminated to users and providers of air traffic services in a timely and efficient manner.

AIM will provide the central point for the dissemination of high quality, configuration controlled information to NAS systems, service providers and users of the NAS. AIM will disseminate data based on the Aeronautical Information Exchange Model (AIXM) protocols.

En Route Automation Modernization (key system)

The En Route Automation Modernization System (ERAM System) will replace the existing diverse but functionally unequal primary and backup channels (Host and DARC) with redundant, functionally equivalent primary and backup channels. The new primary and backup channels achieve identical full functionality by using highly reliable fault tolerant processing elements running identical software. A tertiary system with diverse software, and physical and electronic isolation from the ERAM primary and back-up systems, will be maintained as fall back until the functionality, reliability, and availability of ERAM is demonstrated in the field. A training subsystem with functionality identical to the operational system will permit training to be conducted in parallel with operations.

In the past decade, several functions (URET, CTAS, etc.) were implemented as outboard processors/processes to the Host. As ERAM evolves in successive builds, this functionality will be integrated into ERAM as described below.

ERAM''s enhanced FDP will accommodate flexible routing around congestion, weather, and restrictions and improve efficiency by providing improved traffic flows. The enhanced ERAM surveillance processing will accomodate a larger geographic coverage, increased quantity of radar inputs and, when available, integration of Automatic Dependent Surveillance Broadcast data. In addition ERAM will use the improved accuracy and information disseminated by the sensors using the All-purpose Structured EUROCONTROL Radar Information Exchange (ASTERIX) format.

ERAM will allow for improved performance of decision support tools such as the Enhanced Traffic Management System (ETMS). ERAM will also incorporate Center-terminal radar approach control automation system (CTAS) functions (descent advisor, timelines, load graphs, automated miles-in-trail, and the situation display) and multi-center metering using miles-in-trail or time-based scheduling and meter lists.

ERAM will employ an industry standard LAN-based system to improve the efficiency of integrating commercial-off-the-shelf solutions in the future. ERAM software will be developed using a common high-level language to increase the FAA''s access to market-based skills and lower the cost of development and lifecycle maintenance. ERAM''s design will enable future enhancements and maintenance of components without affecting operational availability and increased productivity from an integrated monitor and control capability.

Global Positioning System (key system)

The Global Positioning System (GPS) is a worldwide, all-weather, satellite-based navigation system developed, maintained & operated by the U.S Department of Defense, and managed by an Interagency executive board. GPS is a (nominal) 24 satellite constellation orbiting at approximately 12,000 miles above the earth in six planes. Each satellite broadcasts a precisely timed L-band signal on the same frequency. User GPS receivers, oboard aircraft, in ground vehicles or hand-held, receive and process the signals from all satellites in view, with a minimum of four satellites necessary to determine the receiver''s three-dimensional position (i.e., latitude, longitude and altitude), velocity (if applicable) and the precise time of day. GPS equipped aircraft can navigate on published jetways or utilize Area Navigation (RNAV) to fly any desired course between two locations.

GPS avionics built to TSO C-129 support en route and terminal area navigation, as well as non-precision instrument approach operations. Approval has been granted for properly certified GPS avionics to be used as a primary means of navigation in oceanic airspace and in certain remote areas. In July 2003 the Wide Area Augmentation System (WAAS)was commissioned to augment the GPS signal to meet primary navigation service requirements for accuracy, coverage, availability, and integrity.

Global Positioning System Avionics (key system)

Global Positioning System (GPS) Avionics process the signals received from four or more GPS satellites and determine the three-dimensional position (i.e., latitude, longitude and altitude) and velocity of an aircraft, as well as the precise time of day. GPS avionics provide an Area Navigation (RNAV) capability that permits operation on any desired course.

GPS avionics built to TSO-C129 do not have augmentation (WAAS, LAAS) and are approved only as a supplemental navigation system in the NAS, meaning that they must be used in conjunction with a primary navigation system. TSO-C129 avionics support en route and terminal area navigation, as well as non-precision instrument approach operations. Approval has been granted for properly certified GPS avionics to be used as a primary means of navigation in oceanic airspace and in certain remote areas. In certain regions of the world (including the NAS), GPS will be augmented (Wide Area and Local Area systems) to satisfy additional requirements for accuracy, coverage, availability, and integrity. Augmented GPS avionics (WAAS, LAAS) are expected to support precision instrument approach operations, and to gain approval as a primary navigation system throughout the NAS. It is anticipated that users will migrate from TSO-C129 avionics to augmented GPS avionics (WAAS, LAAS).

Local Area Augmentation System Avionics (key system)

Local Area Augmentation System Avionics uses position corrections provided by GPS and WAAS that are received through a VHF communications data link using existing VOR frequencies to provide a space-based precision approach navigation capability to the NAS that meets the requirements for all weather approach and landing capability. Additionally, LAAS Avionics provides a signal consisting of position, velocity, and time (PVT) that may be used in applications to support surface vehicle location.

Local Area Augmentation System Category I (key system)

The Local Area Augmentation System Category I (LAAS CAT I) is a safety-critical precision navigation and landing system that augments Global Positioning System (GPS)range data to provide aircraft position accuracy necessary for CAT I precision approaches; i.e., 200 foot decision height and one-half mile visibility. LAAS will provide service to suitably equipped users for runways equipped with required peripheral systems; e.g., Approach zone Runway Visual Range (RVR) and Approach Lighting System (ALS). The LAAS signal-in-space will provide: (1) local area differential corrections for GPS satellites and WAAS Geostationary Earth Orbit (GEO) satellites; (2) the associated integrity parameters; and (3) the path points that describe the final approach segment.

The LAAS CAT I will utilize multiple GPS reference receivers and their associated antennas, all located within the airport boundary, to receive and decode the GPS and WAAS GEO range measurements and navigation data. The LAAS information is broadcast to aircraft operating in the local terminal area (nominally 20 nautical miles (nmi)) via a LAAS very high frequency (VHF) data broadcast (VDB) transmission.

Standard Terminal Automation Replacement System (key system)

The Standard Terminal Automation Replacement System (STARS) processes primary and secondary radar information to acquire and track data points to display aircraft position for controllers. STARS provides safety tools such as, conflict alert (CA), Mode C intruder (MCI), final monitoring aid (FMA), Minimum Safe Altitude Warning (MSAW), Converging Runway

Display Aid (CARDA), and Controller Automated Spacing Aid (CASA). Also, STARS provides the capability to implement the following enhancements: improved radar processing, Global Positioning System (GPS) compatibility, adaptive routing, Center Terminal Radar Approach Control (TRACON) Automation System (CTAS), data link implementation, improved weather display, and better utilization of traffic management information.

System Wide Information Management Build 1B (key system)

Build 1B provides all items in 1A, including more NAS information. This build integrates Flight and Surveillance Information systems into the SWIM architecture.

Wide Area Augmentation System (key system)

The Wide Area Augmentation System (WAAS) consists of a distributed array of Reference and Master Stations designed to provide range correction and integrity information messages that are used by WAAS-capable Global Positioning System (GPS)avionics to accurately determine an aircraft''s 3-dimensional position in space. Accurately surveyed WAAS Reference Stations (WRS) receive and process GPS satellite range data which is forwarded to redundant WAAS Master Stations (WMS) for additional processing before sending the resulting range-correction data to redundant WAAS Ground Uplink Stations (GUS). The GUS transmit the data to Geostationary (GEO) satellites which retransmit them on a GPS civil-use frequency for reception by GPS/WAAS avionics. The WAAS data enables aircraft to determine their position in the airspace with an accuracy that will enable, for WAAS-equipped aircraft, introduction of advanced navigation initiatives such as precision and non-precision approaches to airports throughout the NAS, and reduced longitudinal separation.

The WAAS service volume includes the contiguous United States, Hawaii, portions of Alaska and the Caribbean, and the US border areas with Canada and Mexico. Planned enhancement of WAAS with additional WRS and GEO satellites will improve the coverage and availability of WAAS. Enhancement of the GPS by the Department of Defense (DoD) will provide a second civil frequency for WAAS that will provide additional improvements in navigation performance throughout the NAS. This latter version of the WAAS will be termed the GPS Landing System (GLS).

Wide Area Augmentation System Avionics (key system)

Airborne Navigation Sensors Using the Global Positioning System (GPS) Augmented by the Wide Area Augmentation System (WAAS) combines navigation solutions from time and pseudoranges provided by the DoD Global Positioning System (GPS) satellites within view of the aircraft and pseudoranges provided by the Wide Area Augmentation (WAAS) geostationary satellites in view to compute navigation guidance with respect to courses selected by the flight crew. GPS/WAAS Avionics are approved for use as a primary means of navigation within the CONUS, where available, to satisfy en route, terminal area, and non-precision approaches providing lateral course guidance only. Lateral Navigation (LNAV)/Vertical Navigation (VNAV) non-precision approaches to lower minima are feasible using baro-altimeter avionics inputs. Lateral with Precision Vertical (LPV) guidance using GPS/WAAS Avionics to satisfy near Category I precision approaches with higher minima than ILS is also feasible, when approved under SIAP.

Support Activities

AT Procedure Development for Expanded Use of RNAV/RNP Procedures

Air Traffic Procedures document air traffic services and how they are implemented. The introduction of new systems, or changes to existing systems, may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

AT Training for Expanded Use of RNAV/RNP Procedures

Air Traffic (AT) training is provided to the AT workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AT Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

FAA Airspace Design for Expanded Use of RNAV/RNP Procedures

FAA Airspace Design provides the aviation community the description, operational composition, and status of airspace/airport components of the NAS. Generally, airspace design begins six months prior to Initial Operating Capability.

FAA Certification for Expanded Use of RNAV/RNP Procedures

FAA certification is an activity necessary to support people and systems in the delivery of NAS services. Avionics and associated systems are deemed to be critical to the safety of flight and must be certificated. In addition certain operators and service providers require to be certified such as pilots, dispatchers and others. Certification will generally begin 24 months prior to Initial Operating Capability, and be complete prior to receiving or giving service.

FAA Flight Check for Expanded Use of RNAV/RNP Procedures

FAA Flight Check is an activity necessary to certify navigational aids required to deliver NAS services. Flight checks ensure that performance standards are met and are completed up to 90 days before Initial Operating Capability to insure safety.

FAA Rulemaking for Expanded Use of RNAV/RNP Procedures

FAA Rulemaking is necessary when Federal Air Regulations require or change the delivery of NAS services. The regulatory process must be complete prior to implement or service provision. The lead time for change vary greatly due to the varieties of scope but will take a minimum of 180 days before implemented.

Non-FAA Pilot Procedure Development for Expanded Use of RNAV/RNP Procedures

A number of NAS users document the way their activities are to be carried out. The introduction of new systems, or changes to existing systems may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development will generally begin once ATC procedures have been established and be complete by 90 days prior to Initial Operating Capability, in order to facilitate training.

People

Aeronautical Charts and Supplements Publication People

The charting of the new airspace and air routes are performed by the FAA National Aeronautical Charting Office. This organization coordinates with the Regional Airspace Manager to publish and distribute aeronautical charts and procedures associated with a newly approved airspace and/or air routes.

Airspace Design Team

The Airspace Design Team maybe made up of personnel from the affected facility(ies), regional personnel, FAA Headquarters personnel, and stakeholders. If airspace controlled by or shared with other government organizations is involved, then that government organization should be represented on the Airspace Design Team. The Airspace Design Team should include or have access to environmental expertise to identify and assist with environmental assessments as required. The Airspace Design Team is responsible for establishing a study charter and conducting the airspace study.

Airspace Liaison Team

The Airspace Liaison Team is composed of the regional airspace branch managers, their National Air Traffic Controllers Association (NATCA) counterparts and FAA Headquarters personnel. The Airspace Liaison Team was created to provide the forum within which the FAA will develop a consensus regarding airspace management issues and activities. This group strives for the following: (1) To establish unity with interested parties and (2) To provide a forum for communicating concerns. The Airspace Liaison Team emphasizes the use of the power of combined experience to derive workable solutions regarding the use of national airspace.

Regional Airspace Manager

The Regional Airspace Manager is responsible for assessing the initial evaluation of proposed airspace changes and coordinating with ATA-200. If needed the regional airspace manager will establish an airspace design team that will be responsible for conducting the airspace study.

Interfaces

Aeronautical Information Management ← (NAS Status Data) → System Wide Information Management Build 1B

"AIM exchanges NAS Status data, including equipment status, airspace schedules and status, contingency routings, and RNP-RNAV routings, with other systems via SWIM.

Aeronautical Information Management — (Weather Data) → System Wide Information Management Build 1B

AIM provides PIREPS for distribution to NAS users via SWIM.

Global Positioning System — (Position Data) → Global Positioning System Avionics

GPS Avionics equipment provides position data by accurately measuring clock and pseudorange data from GPS satellites.

Global Positioning System — (Position Data) → Local Area Augmentation System Category I

LAAS Category I systems will be installed at airports which require a standalone navigation and landing capability and at airports where GPS/WAAS coverage is unable to meet existing Category I navigation and landing requirements due to insufficient satellite coverage or availability (i.e. some locations in Alaska). LAAS will provide precise correction data to airborne and surface receivers that will provide a navigation accuracy of less than 4 meters to distances of 20 miles or more from each runway end. The LAAS system is designed to collect data from GPS satellites in view, make the necessary corrections and transmit them via VHF broadcast to aircraft. LAAS will satisfy the need of providing all-weather approach and landing as well as surface navigation capabilities with significant improvements in service flexibility, safety, and user operating cost. LAAS will accomplish this through reduced siting constraints, and reduced ground and avionics installation cost. A single LAAS system will be capable of providing precision approach capabilities to multiple runways.

Global Positioning System — (Position Data) → Wide Area Augmentation System

WAAS capability derives from a network of 25 WAAS Reference Stations (WRS), two WAAS Master Stations (WMS), and two WAAS Ground Uplink Stations (GUS) and their associated GEO satellites. Signals from GPS satellites are monitored by the precisely surveyed WRSs. Each WRS receives and examines the signals from all GPS satellites in view for validity and integrity and, using FAA networks, relays its data to both WMS's. The WMS's process the data to determine the integrity, ionospheric and differential corrections, and residual errors associated with the data from each monitored GPS satellite. The WMS's prepare a correction messages which are relayed to the GUS's for uplink to and re-broadcast by the GEO's on the GPS frequency (designated L1; 1,575.42 MHz).

Global Positioning System — (Position Data) → Wide Area Augmentation System Avionics

WAAS (or GPS/WAAS) avionics consists of navigation sensors or stand-alone receiver/navigators which use GPS augmented by WAAS that combine navigation solutions from time and pseudoranges provided by the GPS satellites within view of the aircraft and pseudoranges provided by the WAAS GEOs in view to compute navigation guidance with respect to courses selected by the flight crew. GPS/WAAS avionics are approved for use as a primary means of navigation within the CONUS, where available, to satisfy en route, terminal area, and non-precision approaches providing lateral course guidance only. Lateral Navigation (LNAV)/Vertical Navigation (VNAV) approaches to lower minima are feasible using baro-altimeter avionics inputs. Lateral with Precision Vertical (LPV) guidance using GPS/WAAS avionics to support near Category I precision approaches with higher minima than ILS is also feasible, when approved under Standard Instrument Approach Procedures.

Local Area Augmentation System Category I — (Position Data) → Local Area Augmentation System Avionics

LAAS Avionics for Category I uses position corrections provided by GPS and WAAS that are received through a VHF communications data link using existing VOR frequencies to provide a space-based precision approach navigation capability to the NAS that meets the requirements for all weather approach and landing capability. Additionally, LAAS is expected to support airport surface operations.

System Wide Information Management Build 1B — (Surveillance Data) → Standard Terminal Automation Replacement System

The SDN distributes surveillance data received from various sensors to NAS automation systems.

Issues

none identified

Service Group Air Traffic Services

Service Airspace Management

Capability Airspace Management

Operational Improvement

Increase Capacity And Efficiency Using RNAV (108209)

Provide airspace design changes to increase access, efficiency and capacity utilization by developing and publishing Area Navigation (RNAV) routings in the NAS. RNAV routing allows greater access to airspace and efficiency of flight by providing the service provider and user greater options.

31-Dec-2007 to 31-Jan-2023

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Provide airspace design changes in Aeronautical Information Management to increase access, efficiency and capacity utilization by developing and publishing Area Navigation (RNAV) routings in the National Airspace System (NAS). RNAV routing allows greater access to airspace and efficiency of flight by providing the service provider and user greater options. RNAV routings include low altitude routes not dependent on the navigational aid NAVAID to NAVAID highway, RNAV VFR corridors through Class B airspace to provide more efficient routings to General Aviation (GA) pilots, and low altitude direct IFR routings for helicopters. The introduction of Global Positioning System (GPS) provides this capability to more flight decks at low cost.

Benefits

Today's airways are based on a system of ground-based navigational aids (Navaids). Flying from one navigational fix to another generally increases user distance and time. Providing charted more direct routes to save time and fuel. Terminal airspace can often be a time and distance constraint on VFR aircraft. By providing RNAV corridors for VFR flights through Class B airspace, access can be gained to more efficient routings without increasing the workload the service provider.

Systems

Aeronautical Information Management (key system)

The AIM system represents the evolution of the acquisition, storage, processing and dissemination of aeronautical information in the NAS. Aeronautical information is defined as any information concerning the establishment, condition, or change in any component (facility, service, or procedure of, of hazard) of the National Airspace System. Aeronautical information comes in two types a somewhat static type, and a more dynamic type. The static portion represents the aeronautical information baseline as a particular date, while the dynamic portion updates particular aspects of the static portion due to system impacts or events. The Static portion represents data that NAS automation systems and other users use to adapt their software to properly operate. The dynamic portion represents information typically contained in NOTAMs that indicate short-term changes to the static data.

Many NAS systems support the acquisition, generation, and dissemination of the static aeronautical information. Information of this type includes airspace structures, airways, locations of NAS facilities, inter-facility letters of agreement and memorandums of understanding, obstructions, standard procedures, airspace charts, etc.

Several NAS systems also support the acquisition, generation, processing, and dissemination of the dynamic aeronautical information. Information of this type includes, facility outages, runway closures, temporary flight restrictions, airspace constraints, SIGMETs, etc. This information must be disseminated to users and providers of air traffic services in a timely and efficient manner.

AIM will provide the central point for the dissemination of high quality, configuration controlled information to NAS systems, service providers and users of the NAS. AIM will disseminate data based on the Aeronautical Information Exchange Model (AIXM) protocols.

Global Positioning System (key system)

The Global Positioning System (GPS) is a worldwide, all-weather, satellite-based navigation system developed, maintained & operated by the U.S Department of Defense, and managed by an Interagency executive board. GPS is a (nominal) 24 satellite constellation orbiting at approximately 12,000 miles above the earth in six planes. Each satellite broadcasts a precisely timed L-band signal on the same frequency. User GPS receivers, oboard aircraft, in ground vehicles or hand-held, receive and process the signals from all satellites in view, with a minimum of four satellites necessary to determine the receiver''s three-dimensional position (i.e., latitude, longitude and altitude), velocity (if applicable) and the precise time of day. GPS equipped aircraft can navigate on published jetways or utilize Area Navigation (RNAV) to fly any desired course between two locations.

GPS avionics built to TSO C-129 support en route and terminal area navigation, as well as non-precision instrument approach operations. Approval has been granted for properly certified GPS avionics to be used as a primary means of navigation in oceanic airspace and in certain remote areas. In July 2003 the Wide Area Augmentation System (WAAS)was commissioned to augment the GPS signal to meet primary navigation service requirements for accuracy, coverage, availability, and integrity.

Global Positioning System Avionics (key system)

Global Positioning System (GPS) Avionics process the signals received from four or more GPS satellites and determine the three-dimensional position (i.e., latitude, longitude and altitude) and velocity of an aircraft, as well as the precise time of day. GPS avionics provide an Area Navigation (RNAV) capability that permits operation on any desired course.

GPS avionics built to TSO-C129 do not have augmentation (WAAS, LAAS) and are approved only as a supplemental navigation system in the NAS, meaning that they must be used in conjunction with a primary navigation system. TSO-C129 avionics support en route and terminal area navigation, as well as non-precision instrument approach operations. Approval has been granted for properly certified GPS avionics to be used as a primary means of navigation in oceanic airspace and in certain remote areas. In certain regions of the world (including the NAS), GPS will be augmented (Wide Area and Local Area systems) to satisfy additional requirements for accuracy, coverage, availability, and integrity. Augmented GPS avionics (WAAS, LAAS) are expected to support precision instrument approach operations, and to gain approval as a primary navigation system throughout the NAS. It is anticipated that users will migrate from TSO-C129 avionics to augmented GPS avionics (WAAS, LAAS).

Support Activities

AT Procedure Development for Increase Capacity and Efficiency using RNAV

Air Traffic Procedures document air traffic services and how they are implemented. The introduction of new systems, or changes to existing systems, may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

AT Training for Increase Capacity and Efficiency using RNAV

Air Traffic (AT) training is provided to the AT workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AT Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

FAA Airspace Design for Increase Capacity and Efficiency using RNAV

FAA Airspace Design provides the aviation community the description, operational composition, and status of airspace/airport components of the NAS. Generally, airspace design begins six months prior to Initial Operating Capability.

FAA Certification for Increase Capacity and Efficiency using RNAV

FAA certification is an activity necessary to support people and systems in the delivery of NAS services. Avionics and associated systems are deemed to be critical to the safety of flight and must be certificated. In addition certain operators and service providers require to be certified such as pilots, dispatchers and others. Certification will generally begin 24 months prior to Initial Operating Capability, and be complete prior to receiving or giving service.

FAA Flight Check for Increase Capacity and Efficiency using RNAV

FAA Flight Check is an activity necessary to certify navigational aids required to deliver NAS services. Flight checks ensure that performance standards are met and are completed up to 90 days before Initial Operating Capability to insure safety.

FAA Rulemaking for Increase Capacity and Efficiency using RNAV

FAA Rulemaking is necessary when Federal Air Regulations require or change the delivery of NAS services. The regulatory process must be complete prior to implement or service provision. The lead time for change vary greatly due to the varieties of scope but will take a minimum of 180 days before implemented.

FAA Spectrum Engineering for Increase Capacity and Efficiency using RNAV

FAA Spectrum Engineering ensures that radio frequency spectrum is available before developing or procuring new communications-electronics systems.

Non-FAA Certification for Increase Capacity and Efficiency using RNAV

FAA standards are applied to user activities necessary to support people and systems in the delivery of NAS services. Aviation avionics and equipment is deemed to be critical to the safety of flight and must be certificated. It is also necessary to certify aviation personnel compliance with these standards. Certification will generally begin 24 months prior to Initial Operating Capability, and be complete prior to receiving service.

Non-FAA Pilot Procedure Development for Increase Capacity and Efficiency using RNAV

A number of NAS users document the way their activities are to be carried out. The introduction of new systems, or changes to existing systems may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development will generally begin once ATC procedures have been established and be complete by 90 days prior to Initial Operating Capability, in order to facilitate training.

People

Aeronautical Charts and Supplements Publication People

The charting of the new airspace and air routes are performed by the FAA National Aeronautical Charting Office. This organization coordinates with the Regional Airspace Manager to publish and distribute aeronautical charts and procedures associated with a newly approved airspace and/or air routes.

Airspace Design Team

The Airspace Design Team maybe made up of personnel from the affected facility(ies), regional personnel, FAA Headquarters personnel, and stakeholders. If airspace controlled by or shared with other government organizations is involved, then that government organization should be represented on the Airspace Design Team. The Airspace Design Team should include or have access to environmental expertise to identify and assist with environmental assessments as required. The Airspace Design Team is responsible for establishing a study charter and conducting the airspace study.

Airspace Liaison Team

The Airspace Liaison Team is composed of the regional airspace branch managers, their National Air Traffic Controllers Association (NATCA) counterparts and FAA Headquarters personnel. The Airspace Liaison Team was created to provide the forum within which the FAA will develop a consensus regarding airspace management issues and activities. This group strives for the following: (1) To establish unity with interested parties and (2) To provide a forum for communicating concerns. The Airspace Liaison Team emphasizes the use of the power of combined experience to derive workable solutions regarding the use of national airspace.

Regional Airspace Manager

The Regional Airspace Manager is responsible for assessing the initial evaluation of proposed airspace changes and coordinating with ATA-200. If needed the regional airspace manager will establish an airspace design team that will be responsible for conducting the airspace study.

Interfaces

Global Positioning System — (Position Data) → Global Positioning System Avionics

GPS Avionics equipment provides position data by accurately measuring clock and pseudorange data from GPS satellites.

Issues

none identified

Service Group Air Traffic Services

Service Airspace Management

Capability Airspace Management

Operational Improvement

Provide Dynamic Resectorization (108207)

Dynamic resectorization provides tools to allow for more definition of airspace configuration changes, with automated functions to evaluate and develop asset assignments. Dynamic resectorization supports system-to-system coordination of the reassignments across facility boundaries. Dynamic resectorization allows more refined mitigation of weather and flow problems than can be conducted with the multiple set of pre-defined and coordinated plans.

30-Jun-2015 to 31-Jan-2023

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Dynamic resectorization provides tools to allow for more definition of airspace configuration changes, with automated functions to evaluate and develop asset assignments. Dynamic resectorization supports system-to-system coordination of the reassignments across facility boundaries. Dynamic resectorization allows more refined mitigation of weather and flow problems than can be conducted with the multiple set of pre-defined and coordinated plans.

Benefits

Dynamic re-sectorization allows the capacity (controllers) to be moved to the changing flow rather than staffing to potential flow changes. These changes are designed during the course of the day; communications, navigation and surveillance assets are evaluated and remapped including voice and data communications to the flight deck via the Communication Management System as well as sensor information via the Surveillance Data Network. When this involves more than one facility the coordination is conducted over the System Wide Information Management, (SWIM), via the Swim Management Unit. Display information is updated in Standard Automation Platform to reflect the changes and at the agreed to moment, all changes are made. The updated information is reflected in new volumes of interest in Flight Object Management System assuring that the flight data is distributed appropriately. The changes are also provided via Aeronautical Information Management and SWIM to all interested parties.

Systems

Aeronautical Information Management (key system)

The AIM system represents the evolution of the acquisition, storage, processing and dissemination of aeronautical information in the NAS. Aeronautical information is defined as any information concerning the establishment, condition, or change in any component (facility, service, or procedure of, of hazard) of the National Airspace System. Aeronautical information comes in two types a somewhat static type, and a more dynamic type. The static portion represents the aeronautical information baseline as a particular date, while the dynamic portion updates particular aspects of the static portion due to system impacts or events. The Static portion represents data that NAS automation systems and other users use to adapt their software to properly operate. The dynamic portion represents information typically contained in NOTAMs that indicate short-term changes to the static data.

Many NAS systems support the acquisition, generation, and dissemination of the static aeronautical information. Information of this type includes airspace structures, airways, locations of NAS facilities, inter-facility letters of agreement and memorandums of understanding, obstructions, standard procedures, airspace charts, etc.

Several NAS systems also support the acquisition, generation, processing, and dissemination of the dynamic aeronautical information. Information of this type includes, facility outages, runway closures, temporary flight restrictions, airspace constraints, SIGMETs, etc. This information must be disseminated to users and providers of air traffic services in a timely and efficient manner.

AIM will provide the central point for the dissemination of high quality, configuration controlled information to NAS systems, service providers and users of the NAS. AIM will disseminate data based on the Aeronautical Information Exchange Model (AIXM) protocols.

Communications Management System (key system)

The CMS Management and Control function performs tasks for overall management and control of all air/ground and ground/ground voice and data communications to support System Wide Information Management (SWIM). CMS will also incorporate a reconfiguration control function to support reconfigurable airspace assignments, data routing, and a digital recording for both voice and data.

The En Route Automation Modernization program has assumed the data recording function via the Standard Automation Platform, and the Digital Voice Recorder System performs the voice recording function. The CMS routing function is a data router that ensures transport of data communications among Air Traffic Control facilities and users of SWIM. Additionally, CMS integrates functionalities inherently provided by the voice switches, the voice recorders, and the ATN Router.

Flight Object Management System - En Route (key system)

The FOMS is a component of the Standard Automation Platform (SAP). The FOMS processes flight data received from multiple sources via the System Wide Information Management (SWIM) Management Unit. The FOMS also receives track data from the Surveillance Data Processor and associates tracks with flight data, producing the flight object, which is published to SWIM for subscriber use. Flight plan support functionality includes end-to-end profile evaluation in all phases of flight and evaluation against static and dynamic constraints (terrain, obstacles, airspace restrictions, etc.). The FOMS supports flight planning up to 180 days prior to day of flight. A user can access the flight object from initial to closeout in the same manner. The FOMS provides end-to-end flight data management from preflight to post analysis. Ownership of the flight object begins and ends with Traffic Flow Management and transitions during the flight to clearance delivery, ramp, surface, departure, transition to cruise, cruise, transition to arrival, and ramp. Flight data management is based on trajectory, assigned volumes, and "necessary" route structure.

Flight Object Management System - Terminal (key system)

The FOMS is a component of the Standard Automation Platform (SAP). The FOMS processes flight data received from multiple sources via the System Wide Information Management (SWIM) Management Unit. The FOMS also receives track data from the Surveillance Data Processor (SDP) and associates tracks with flight data, producing the flight object, which is published to SWIM for subscriber use. Flight plan support functionality includes end-to-end profile evaluation in all phases of flight and evaluation against static and dynamic constraints (terrain, obstacles, airspace restrictions, etc.). The FOMS supports flight planning up to 180 days prior to day of flight. A user can access the flight object from initial to closeout in the same manner. The FOMS provides end-to-end flight data management from preflight to post analysis. Ownership of the flight object begins and ends with Traffic Flow Management and transitions during the flight to clearance delivery, ramp, surface, departure, transition to cruise, cruise, transition to arrival, and ramp. Flight data management is based on trajectory, assigned volumes, and "necessary" route structure.

Next Generation Traffic Flow Management

The Next Generation Traffic Flow Management (NG-TFM) system provides an array of automation and data processing tools for Traffic Management Specialists (TMS) and Traffic Management Coordinators (TMC), as well as a gateway that enables NAS users to make changes in flight schedules based on planned traffic initiatives (e.g., Ground Delay Programs) and other NAS data. This enhanced decision support system provides increased information exchange between FAA service providers and NAS users. NG-TFM receives flight schedules from NAS users (e.g., air carriers) and combines these with weather data, NAS status data, and planned traffic initiatives to generate detailed graphical and textual traffic displays as far as 24 hours into the future on both national and local scales. Features include both pre-flight and post-flight analysis tools, flight data archiving, enhanced traffic displays, traffic strategy (one or more initiatives) automation, "what if" strategy analysis, and automated TFM training tools.

NG-TFM is comprised of five different software component systems and will include a hardware and operating system software tech refresh. The complete NG-TFM software package includes changes to support interfaces with the Flight Object Management System (FOMS) and System Wide Information Management (SWIM). When complete, this will establish a new NG-TFM system baseline.

Standard Automation Platform Convergence Phase 1 (key system)

The purpose of Standard Automation Platform Convergence Phase 1 (SAP Conv P1) is to reduce both procurement and recurring costs by standardizing and sharing as many hardware and software ATC Automation components as possible.

An engineering convergence task will begin in fiscal year 2005 and run through 2015. All components from each of the automation systems (STARS, ERAM, TFM, etc.) will be analyzed, and the "best of breed" and "core" components will be selected. SAP convergence will be performed in the following areas: (1) Hardware; (2) System Software (operating systems, Commercial-Off-The-Shelf tools, etc.); (3) ATC applications that can be shared across domains; (4) ATC applications that are unique to a domain; and (5) ATC system support tools that can be shared across domains (adaptation, data extraction or systems analysis recording, data reduction and analysis tools, etc.). Proven STARS and ERAM components will be slected, integrated into the SAP, and rigorously tested for replacing STARS and ERAM components at or near their end of service life.

Prototyping begun under Phase 1 will continue with SAP Conv P2. The results of both efforts will lead to refining the requirements to develop the SAP WS mechanism with SDP and FOMS applications.

Surveillance Data Network (key system)

National Airspace System (NAS) surveillance systems, including radar and automatic dependent surveillance systems will provide surveillance data objects via the Surveillance Data Network (SDN), which is a sub-network of the System Wide Information Management (SWIM) and the FAA Telecommunication Infrastructure (FTI). The published Surveillance Data Objects (SDO) will be made available to NAS and other users, including the Transportation Security Administration, Department of Defense, and others. Surveillance data availability supports 3-mile separation standards, gate-to-gate traffic management, seamless airspace, and dynamic resectorization. Improved surveillance information is provided in a timely and consistent manner seamlessly across the NAS for operations, planning, and decision making. The information will be available to all users and service providers via SDO in near real time. This information enables decisions to be based on a shared common view of situations, even as conditions are changing. Improved surveillance with SDOs will provide the automation higher quality of data for seamless surveillance and, in combination with other capabilities and new procedures, enable capacity and safety improvements. These benefits accrue from increased situation awareness by decision makers and improved operation of decision support and analysis tools that use surveillance information.

System Wide Information Management Build 1B

Build 1B provides all items in 1A, including more NAS information. This build integrates Flight and Surveillance Information systems into the SWIM architecture.

Support Activities

AT Procedure Development for Dynamic Resectorization

Air Traffic Procedures document air traffic services and how they are implemented. The introduction of new systems, or changes to existing systems, may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

AT Training for Dynamic Resectorization

Air Traffic (AT) training is provided to the AT workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AT Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

FAA Adaptation for Dynamic Resectorization

Many NAS systems incorporate parameters that are adjustable. This allows for the setting of system parameters to optimize performance at each particular site. When new systems that have adjustable parameters are introduced into the NAS, adaptation data must be developed for the system. Environmental and procedural changes may also result in the need to modify FAA Adaptation Data. Generally, adaptation will begin 12 months before IOC and continue until 12 months after IOC.

People

Airline Operations Center Dispatcher

The Airline Operations Center Dispatcher (AOC Dispatcher) is a major airline employee that enters bulk flight plan requests and works with FAA by revising schedules and providing flight cancellations based on FAA provided data (aggregate demand lists, arrival rates, and parameters for anticipated ground delays.)

Radar Controller

A Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate automated handoffs; Assist the radar associate controller with non-automated handoff actions when needed; Assist the radar associate controller in coordination when needed; Scan radar display; Correlate with flight progress strip information; Ensure computer entries are completed on instructions or clearances you issue or receive; Ensure strip marking is completed on instructions or clearances you issue or receive.

Traffic Management Coordinators

Traffic Management Coordinators track and predict traffic flows, analyze ground delays, evaluate alternative routing strategies, and plan local traffic patterns at the local facility (ARTCC, TRACON, or Towers)

Traffic Management Specialist

Traffic Management Specialists perform the following activities: Balance air traffic demand with the airspace's capacity to maintain maximum and efficient utilization of the NAS; Coordinate and implement traffic management directives if needed for area of responsibility; Monitor and balance traffic flows within the area of responsibility in accordance with traffic management directives; Evaluate effectiveness of traffic management directives and make necessary adjustments; Document delay information.

Interfaces

Communications Management System ⇐ (Data Communication) ⇒ Communications Management System

Controllers in the same or different facilities communicate via CMS.

Communications Management System ⇐ (Voice Communication) ⇒ Communications Management System

Controllers in the same or different facilities communicate via CMS.

Issues

none identified

Service Group Air Traffic Services

Service Airspace Management

Capability Airspace Management

Operational Improvement

Provide Flexible Airspace Management (108206)

Provide expanded capabilities to utilize the multiple configurations. The capability to define and manage asset assignment (re-mapping of flight information, radar information etc, to the appropriate positions) is greatly enhanced making the use of multiple pre-defined configurations including sharing of airspace across facility boundaries possible. Includes tools to define and support the design of alternatives as well as re-mapping of flight information, radar information etc, to the appropriate positions.

31-Jul-2009 to 01-Jul-2018

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Flexible Airspace Management provides expanded capabilities to utilize the multiple configurations. The capability to define and manage asset assignment (re-mapping of flight information, radar information, etc., to the appropriate positions) is greatly enhanced, making the use of multiple pre-defined configurations including sharing of airspace across facility boundaries possible. Flexible Airspace Management includes tools to define and support the design of alternatives as well as re-mapping of flight information, radar information, etc., to the appropriate positions.

Benefits

The concept of airspace sectorization underlying today's air traffic control (ATC) dates from a time when the flow of traffic was more structured and predictable than it is today. Sector boundaries are determined in a strategic, off-line process that evaluates typical traffic and controller workload patterns and subdivides the airspace to make best use of the available resources. When conditions deviate substantially from the norm, limited and preplanned airspace adjustments, increased sector staffing, and traffic restrictions are employed as appropriate to accommodate the situation. These solutions are effective but costly. A more flexible airspace concept such as in ERAM and future STARS allows boundaries to be adjusted to the prevailing traffic flow, giving ATC personnel an additional tool that may be used to manage sector demand and reduce boundary-related controller workload. In this phase the adjustments are based on multiple pre-configured alternatives are developed, published in AIM during long term planning. Access to the plans is available via the System Wide Information Management system to all interested parties.

Systems

Aeronautical Information Management (key system)

The AIM system represents the evolution of the acquisition, storage, processing and dissemination of aeronautical information in the NAS. Aeronautical information is defined as any information concerning the establishment, condition, or change in any component (facility, service, or procedure of, of hazard) of the National Airspace System. Aeronautical information comes in two types a somewhat static type, and a more dynamic type. The static portion represents the aeronautical information baseline as a particular date, while the dynamic portion updates particular aspects of the static portion due to system impacts or events. The Static portion represents data that NAS automation systems and other users use to adapt their software to properly operate. The dynamic portion represents information typically contained in NOTAMs that indicate short-term changes to the static data.

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Several NAS systems also support the acquisition, generation, processing, and dissemination of the dynamic aeronautical information. Information of this type includes, facility outages, runway closures, temporary flight restrictions, airspace constraints, SIGMETs, etc. This information must be disseminated to users and providers of air traffic services in a timely and efficient manner.

AIM will provide the central point for the dissemination of high quality, configuration controlled information to NAS systems, service providers and users of the NAS. AIM will disseminate data based on the Aeronautical Information Exchange Model (AIXM) protocols.

En Route Automation Modernization

The En Route Automation Modernization System (ERAM System) will replace the existing diverse but functionally unequal primary and backup channels (Host and DARC) with redundant, functionally equivalent primary and backup channels. The new primary and backup channels achieve identical full functionality by using highly reliable fault tolerant processing elements running identical software. A tertiary system with diverse software, and physical and electronic isolation from the ERAM primary and back-up systems, will be maintained as fall back until the functionality, reliability, and availability of ERAM is demonstrated in the field. A training subsystem with functionality identical to the operational system will permit training to be conducted in parallel with operations.

In the past decade, several functions (URET, CTAS, etc.) were implemented as outboard processors/processes to the Host. As ERAM evolves in successive builds, this functionality will be integrated into ERAM as described below.

ERAM''s enhanced FDP will accommodate flexible routing around congestion, weather, and restrictions and improve efficiency by providing improved traffic flows. The enhanced ERAM surveillance processing will accomodate a larger geographic coverage, increased quantity of radar inputs and, when available, integration of Automatic Dependent Surveillance Broadcast data. In addition ERAM will use the improved accuracy and information disseminated by the sensors using the All-purpose Structured EUROCONTROL Radar Information Exchange (ASTERIX) format.

ERAM will allow for improved performance of decision support tools such as the Enhanced Traffic Management System (ETMS). ERAM will also incorporate Center-terminal radar approach control automation system (CTAS) functions (descent advisor, timelines, load graphs, automated miles-in-trail, and the situation display) and multi-center metering using miles-in-trail or time-based scheduling and meter lists.

ERAM will employ an industry standard LAN-based system to improve the efficiency of integrating commercial-off-the-shelf solutions in the future. ERAM software will be developed using a common high-level language to increase the FAA''s access to market-based skills and lower the cost of development and lifecycle maintenance. ERAM''s design will enable future enhancements and maintenance of components without affecting operational availability and increased productivity from an integrated monitor and control capability.

Standard Terminal Automation Replacement System (key system)

The Standard Terminal Automation Replacement System (STARS) processes primary and secondary radar information to acquire and track data points to display aircraft position for controllers. STARS provides safety tools such as, conflict alert (CA), Mode C intruder (MCI), final monitoring aid (FMA), Minimum Safe Altitude Warning (MSAW), Converging Runway Display Aid (CARDA), and Controller Automated Spacing Aid (CASA). Also, STARS provides the capability to implement the following enhancements: improved radar processing, Global Positioning System (GPS) compatibility, adaptive routing, Center Terminal Radar Approach Control (TRACON) Automation System (CTAS), data link implementation, improved weather display, and better utilization of traffic management information.

System Wide Information Management Build 1A (key system)

SWIM provides for National Airspace System (NAS)-wide transport and sharing of information between the Federal Aviation Administration and users. SWIM is a consistent and single point of entry for users to publish and subscribe to NAS data. SWIM provides context-sensitive information to NAS elements that require the information. SWIM replaces many single-focus networks, such as FIRMNet and CDMnet. This build will integrate Aeronautical, Weather, and NAS Resource Status information systems into the SWIM architecture. A SWIM Management Unit, at each facility, will support the sending (publishing) and receiving (subscribing) of data on SWIM and the SDN. A central SWIM Directory Management Unit will maintain a directory of data available for subscription and publication.

Support Activities

AT Procedure Development for Flexible Airspace Management

Air Traffic Procedures document air traffic services and how they are implemented. The introduction of new systems, or changes to existing systems, may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

AT Training for Flexible Airspace Management

Air Traffic (AT) training is provided to the AT workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AT Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

FAA Adaptation for Flexible Airspace Management

Many NAS systems incorporate parameters that are adjustable. This allows for the setting of system parameters to optimize performance at each particular site. When new systems that have adjustable parameters are introduced into the NAS, adaptation data must be developed for the system. Environmental and procedural changes may also result in the need to modify FAA Adaptation Data. Generally, adaptation will begin 12 months before IOC and continue until 12 months after IOC.

FAA Airspace Design for Flexible Airspace Management

FAA Airspace Design provides the aviation community the description, operational composition, and status of airspace/airport components of the NAS. Generally, airspace design begins six months prior to Initial Operating Capability.

People

Radar Controller

A Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate automated handoffs; Assist the radar associate controller with non-automated handoff actions when needed; Assist the radar associate controller in coordination when needed; Scan radar display; Correlate with flight progress strip information; Ensure computer entries are completed on instructions or clearances you issue or receive; Ensure strip marking is completed on instructions or clearances you issue or receive.

Traffic Management Coordinators

Traffic Management Coordinators track and predict traffic flows, analyze ground delays, evaluate alternative routing strategies, and plan local traffic patterns at the local facility (ARTCC, TRACON, or Towers)

Traffic Management Specialist

Traffic Management Specialists perform the following activities: Balance air traffic demand with the airspace's capacity to maintain maximum and efficient utilization of the NAS; Coordinate and implement traffic management directives if needed for area of responsibility; Monitor and balance traffic flows within the area of responsibility in accordance with traffic management directives; Evaluate effectiveness of traffic management directives and make necessary adjustments; Document delay information.

Interfaces

Aeronautical Information Management ← (NAS Status Data) → System Wide Information Management Build 1A

AIM exchanges NAS Status data, including equipment status, airspace schedules and status, contingency routings, and RNP-RNAV routings, with other systems via SWIM.

Aeronautical Information Management — (Weather Data) → System Wide Information Management Build 1A

AIM provides PIREPS for distribution to NAS users via SWIM.

System Wide Information Management Build 1A — (Surveillance Data) → Standard Terminal Automation Replacement

System

The SDN distributes surveillance data received from various sensors to NAS automation systems.

Issues

none identified

Service Group Air Traffic Services

Service Airspace Management

Capability Airspace Management

Operational Improvement

Redesign High Altitude Airspace (108211)

Provide airspace designs that exploit the full advantage of the flight deck capability as well as the advanced Decision Support Tools. Sizing the volume of coverage and traffic for the service provider based on fully exploiting the capability of Area Navigation (RNAV), Requied Navigational Performance (RNP) and decision aiding. Starting first at the highest altitudes with crafting the design and procedures to reduce the required interaction between the controller and aircraft while providing flexibility to the user in planning the flight profile. Operational Description as part of the National Airspace Redesign, the High Altitude Redesign (HAR) programs focus is to develop and implement fundamental changes in navigation structure and operating methods for en route operations for the high altitude airspace environment. RNAV/RNP), and point-to-point navigation will incrementally replace the higher altitudes of the present jet-route structure. The redesign activities are founded on industry/government recommended concepts from RTCA Select Committee 192 (SC192). The goal is to provide more freedom to properly equipped users and to achieve the economic benefits of flying user selected non-restrictive routings.The redesign implementation will be done in phases and will progress based on customer equipage and technological advancement in ground based Air Traffic Control systems. The initial implementation, Phase 1, is at the very high flight levels. Additional flight levels will be added as technology and systems allow.

26-Aug-2003 to 31-Jul-2017

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

As part of the National Airspace Redesign, the High Altitude Redesign (HAR) program's focus is to develop and implement fundamental changes in navigation structure and operating methods for en route operations for the high altitude airspace environment. Required Navigational Performance (RNP), Area Navigation (RNAV), and point-to-point navigation will incrementally replace the higher altitudes of the present jet-route structure. The redesign activities are founded on industry/government-recommended concepts from RTCA Select Committee 192 (SC192). The goal is to provide more freedom to properly equipped users and to achieve the economic benefits of flying user-selected non-restrictive routings. The redesign implementation will be done in phases and will progress based on customer equipage and technological advancements such as User Request Evaluation Tool (URET) and the grid-system in ground-based Air Traffic Control (ATC) systems. The initial implementation, Phase 1, is at the very high flight levels. Additional flight levels will be added as technology and systems allow.

Benefits

Increased efficiency in routings since aircraft will fly on user preferred trajectories except a point of congestion. Points of congestion due to mixing flow or special use airspace will be mitigated by the use of RNAV/RNP defined routes providing for the most time, distance, altitude merging of the traffic.

Systems

Global Positioning System (key system)

The Global Positioning System (GPS) is a worldwide, all-weather, satellite-based navigation system developed, maintained & operated by the U.S Department of Defense, and managed by an Interagency executive board. GPS is a (nominal) 24 satellite constellation orbiting at approximately 12,000 miles above the earth in six planes. Each satellite broadcasts a precisely timed L-band signal on the same frequency. User GPS receivers, oboard aircraft, in ground vehicles or hand-held, receive and process the signals from all satellites in view, with a minimum of four satellites necessary to determine the receiver''s three-dimensional position (i.e., latitude, longitude and altitude), velocity (if applicable) and the precise time of day. GPS equipped aircraft can navigate on published jetways or utilize Area Navigation (RNAV) to fly any desired course between two locations.

GPS avionics built to TSO C-129 support en route and terminal area navigation, as well as non-precision instrument approach operations. Approval has been granted for properly certified GPS avionics to be used as a primary means of navigation in oceanic airspace and in certain remote areas. In July 2003 the Wide Area Augmentation System (WAAS)was commissioned to augment the GPS signal to meet primary navigation service requirements for accuracy, coverage, availability, and integrity.

Global Positioning System Avionics (key system)

Global Positioning System (GPS) Avionics process the signals received from four or more GPS satellites and determine the three-dimensional position (i.e., latitude, longitude and altitude) and velocity of an aircraft, as well as the precise time of day. GPS avionics provide an Area Navigation (RNAV) capability that permits operation on any desired course.

GPS avionics built to TSO-C129 do not have augmentation (WAAS, LAAS) and are approved only as a supplemental navigation system in the NAS, meaning that they must be used in conjunction with a primary navigation system. TSO-C129 avionics support en route and terminal area navigation, as well as non-precision instrument approach operations. Approval has been granted for properly certified GPS avionics to be used as a primary means of navigation in oceanic airspace and in certain remote areas. In certain regions of the world (including the NAS), GPS will be augmented (Wide Area and Local Area systems) to satisfy additional requirements for accuracy, coverage, availability, and integrity. Augmented GPS avionics (WAAS, LAAS) are expected to support precision instrument approach operations, and to gain approval as a primary navigation system throughout the NAS. It is anticipated that users will migrate from TSO-C129 avionics to augmented GPS avionics (WAAS, LAAS).

User Request Evaluation Tool National Deployment (key system)

The User Request Evaluation Tool National Deployment (URET National Deployment) provides conflict probe capabilities to the data controller display in the Air Route Traffic Control Centers (ARTCC) facilities. URET combines real-time flight plan and radar track data with site adaptation, aircraft performance characteristics, and winds and temperatures aloft to construct four dimensional flight profiles, or trajectories, for pre-departure and active flights. For active flights, it also adapts itself to the observed behavior of the aircraft, dynamically adjusting predicted speeds, climb rates, and descent rates based on the performance of each individual flight as it is tracked through en route airspace, all to maintain aircraft trajectories to get the best possible prediction of future aircraft positions. URET uses its predicted trajectories to continuously detect potential aircraft conflicts up to 20 minutes into the future and to provide strategic notification to the appropriate sector. URET enables controllers to "look ahead" for potential conflicts through "what if" trial planning of possible flight path amendments. It enables controllers to accommodate user-preferred, off-airway routing to enable aircraft to fly more efficient routes, which reduce time and fuel consumption.

The National Deployment deployment of URET adds systems to the remaining ARTCCs and tech refreshes the original systems fielded under URET CCLD. The tech refresh provides additional functionalities. It will also introduce infrastructure changes to synchronize with DSR D-side infrastructure changes (see the DSR Mod (Tech Refresh) mechanism), both of which are driven by future ERAM infrastructure changes. New URET functions include: Alternate Flight Plan Processing; Automatic Assistance Dynamic Rerouting; ICAO flight plan processing; Problem Analysis, Resolution and Ranking; Airspace Redesign; and Tech Refresh. ERAM will replace the URET Fiber Distributed Data Interface (FDDI) LAN infrastructure, the URET Conflict Probe processor, and add a redundant Conflict Probe backup capability.

Support Activities

AT Procedure Development for High Altitude Redesign

Air Traffic Procedures document air traffic services and how they are implemented. The introduction of new systems, or changes to existing systems, may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

AT Training for High Altitude Redesign

Air Traffic (AT) training is provided to the AT workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AT Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

FAA Airspace Design for High Altitude Redesign

FAA Airspace Design provides the aviation community the description, operational composition, and status of airspace/airport components of the NAS. Generally, airspace design begins six months prior to Initial Operating Capability.

FAA Certification for High Altitude Redesign

FAA certification is an activity necessary to support people and systems in the delivery of NAS services. Avionics and associated systems are deemed to be critical to the safety of flight and must be certificated. In addition certain operators and service providers require to be certified such as pilots, dispatchers and others. Certification will generally begin 24 months prior to Initial Operating Capability, and be complete prior to receiving or giving service.

FAA Flight Check for High Altitude Redesign

FAA Flight Check is an activity necessary to certify navigational aids required to deliver NAS services. Flight checks ensure that performance standards are met and are completed up to 90 days before Initial Operating Capability to insure safety.

FAA Rulemaking for High Altitude Redesign

FAA Rulemaking is necessary when Federal Air Regulations require or change the delivery of NAS services. The regulatory process must be complete prior to implement or service provision. The lead time for change vary greatly due to the varieties of scope but will take a minimum of 180 days before implemented.

Non-FAA Pilot Procedure Development for High Altitude Redesign

A number of NAS users document the way their activities are to be carried out. The introduction of new systems, or changes to existing systems may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development will generally begin once ATC procedures have been established and be complete by 90 days prior to Initial Operating Capability, in order to facilitate training.

Non-FAA Pilot Training for High Altitude Redesign

Non-FAA Pilot Training is provided to educate pilots as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional pilot training. Training will generally begin 60 days prior to IOC and be complete within one year following Full Operating Capability.

People

Aeronautical Charts and Supplements Publication People

The charting of the new airspace and air routes are performed by the FAA National Aeronautical Charting Office. This organization coordinates with the Regional Airspace Manager to publish and distribute aeronautical charts and procedures associated with a newly approved airspace and/or air routes.

Airspace Design Team

The Airspace Design Team maybe made up of personnel from the affected facility(ies), regional personnel, FAA Headquarters personnel, and stakeholders. If airspace controlled by or shared with other government organizations is involved, then that government organization should be represented on the Airspace Design Team. The Airspace Design Team should include or have access to environmental expertise to identify and assist with environmental assessments as required. The Airspace Design Team is responsible for establishing a study charter and conducting the airspace study.

Airspace Liaison Team

The Airspace Liaison Team is composed of the regional airspace branch managers, their National Air Traffic Controllers Association (NATCA) counterparts and FAA Headquarters personnel. The Airspace Liaison Team was created to provide the forum within which the FAA will develop a consensus regarding airspace management issues and activities. This group strives for the following: (1) To establish unity with interested parties and (2) To provide a forum for communicating concerns. The Airspace Liaison Team emphasizes the use of the power of combined experience to derive workable solutions regarding the use of national airspace.

Regional Airspace Manager

The Regional Airspace Manager is responsible for assessing the initial evaluation of proposed airspace changes and coordinating with ATA-200. If needed the regional airspace manager will establish an airspace design team that will be responsible for conducting the airspace study.

Interfaces

Global Positioning System — (Position Data) → Global Positioning System Avionics

GPS Avionics equipment provides position data by accurately measuring clock and pseudorange data from GPS satellites.

User Request Evaluation Tool National Deployment ← (Flight Data) → User Request Evaluation Tool National Deployment

User Request Evaluation Tool National Deployment ← (Track Data) → User Request Evaluation Tool National Deployment

Issues

none identified

Service Group Air Traffic Services

Service Emergency and Alerting

Capability Alerting Support

Operational Improvement

Current Emergency Alerting Support (106201)

Indirect assistance is for events and circumstances in which the response is external to the system. For example, when information is received that an aircraft is overdue or missing, emergency locator transmitter signals are received, or search and rescue services may be required. Alerting support provides the relevant information and coordinates with appropriate international, military, federal, state, and local agencies. The appropriate organization(s) then provide the direct response(s).

01-Jan-2007 to 31-Jul-2008

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

The National Search and Rescue (SAR) Plan assigns search and rescue responsibilities to military agencies for conducting physical search and rescue operations. Under the plan, the U.S. Coast Guard (USCG) is responsible for coordinating SAR in the Maritime Region, and the United States Air Force (USAF) is responsible in the Inland Region. To carry out these responsibilities, the USCG and the USAF have established the Rescue Coordination Center (RCC) to direct SAR activities within their regions. The FAA provides emergency services to aircraft in distress, and assures that SAR procedures are initiated if an aircraft becomes overdue or unreported. This is accomplished through the Air Route Traffic Control Centers (ARTCC) for Instrument Flight Rules (IFR) aircraft, and through the Automated Flight Service Stations (AFSS) for Visual Flight Rules (VFR) aircraft. The FAA also is responsible for attempting to locate overdue or unreported aircraft by Information Request (INREQ) and Alert Notice (ALNOT) communications searches, and cooperating in the physical search by making all possible facilities available for use of the searching agencies. When an aircraft is overdue or missing, a communications search is initiated to determine if or when the aircraft last contacted an air traffic control facility. The aircraft's essential information is gathered including flight plan data, last known position, last recorded heading, search area conditions - which includes current and forecasted weather - and distributed to the RCC for the rescue coordinator prior to him initiating the SAR effort. If air traffic control facilities hear or receive a report of an Emergency Locater Transmitter (ELT) signal, they attempt to determine the location of the signal. Direction finding facilities obtain fixed bearings, and any other pertinent information from the ELT signal. This information is also forwarded to the RCC to support the SAR activities. Different facilities are responsible for alert support. These responsibilities are noted below.

Air Traffic Control Towers (ATCT), Terminal Radar Approach Controls (TRACON), and ARTCCs consider an IFR aircraft overdue when neither communications nor radar contact, this information derived from the radar controllers Display System Replacement (DSR), can be established and 30 minutes have passed since its Estimated Time of Arrival (ETA) over a specified or compulsory reporting point or at a clearance limit in their area, or its clearance void time.

If they have reason to believe that an aircraft is overdue prior to 30 minutes, they take the appropriate action immediately, which would include notifying the RCC and starting SAR activities. The ARTCC in whose area the aircraft is first unreported or overdue makes the determination that an aircraft is overdue or missing and takes the action to advise the RCC. ATCTs and TRACONs alert the ARTCC when an aircraft is considered to be in emergency status and may require SAR procedures, or when an IFR aircraft is overdue. The facility forwards pertinent information such as flight plan information, time of last transmission received, last position report, number of persons on board, fuel status, facility working the aircraft and frequency, action taken by reporting facility and proposed action, last known position, estimated present position, and maximum range of flight of the aircraft based on remaining fuel and airspeed. Additional information, such as current area weather, would include the position of other aircraft near the aircraft's route of flight whether or not an ELT signal has been heard or reported in the vicinity of the last known position and other pertinent information that may help locate the aircraft. The ARTCC would then alert the RCC and forward all the available information.

The ARTCC also issues an ALNOT to all facilities generally 50 miles on either side of the route of flight, from the last reported position to destination, including the original or amended flight plan, as appropriate, and the last known position of the aircraft. At the recommendation of the RCC, or as deemed appropriate, the ALNOT may be issued to cover the maximum range of the aircraft. An ALNOT must be issued before the RCC can begin SAR procedures. When an air traffic control facility receives an INREQ or ALNOT, it checks the position records to determine whether the aircraft has contacted the facility. It notifies the originator of the results or status of this check within one hour of the time the alert was received. It retains the alert in an active status, and immediately notifies the originator of subsequent contact, until a cancellation is received. The ARTCC plots the flight path of the aircraft on a chart, including position reports, predicted positions, possible range of flight, and any other pertinent information, derived from DSR and en route Host Computer System. They solicit the assistance of other aircraft known to be operating near the aircraft in distress or its last known position, and forward this information to the RCC as appropriate.

The ARTCC would transfer responsibility for further search to the RCC when (1) 30 minutes have elapsed after the estimated aircraft fuel exhaustion time, (2) the aircraft has not been located within one hour after ALNOT issuance, or (3) when the ALNOT search has been completed with negative results. The ARTCC cancels the ALNOT when the aircraft is located or the search is abandoned.

The ARTCC also serves as the contact point for collecting information and coordinating with the RCC, on all ELT signals. ELT signals are required for most general aviation airplanes. Various ELT signals were developed as a means of locating downed aircraft. These electronic, battery operated transmitters operate on one of three frequencies including 121.5 MHz, 243.0 MHz, and the newer 406 MHz. ELT signals operating on 121.5 MHz and 243.0 MHz are analog devices. The newer 406 MHz ELT is a digital transmitter that can be encoded with the owner's contact information or aircraft data.

In the case of VFR aircraft, the Flight Service Station (FSS) plays an important role in the alerting support capability function. The En Route Flight Advisory Service (EFAS) is specifically designed to provide en route aircraft with timely and meaningful weather advisories pertinent to the type of flight intended, route of flight, and altitude. The EFAS position receives and forwards reports of ELT signals and seeks to verify those ELT signals by requesting other aircraft to monitor the emergency frequency and report.

The FSS specialist considers an aircraft on a VFR flight plan overdue when it fails to arrive 30 minutes after its ETA, and communications or location cannot be established. An aircraft not on a flight plan is considered as overdue at the actual time a reliable source reports it to be at least one hour late at destination. Based on this overdue time, they apply the same procedures and action times as for aircraft on a flight plan. When such a report is received, they verify that the aircraft actually departed and that the request is for a missing aircraft rather than a person. Missing person reports are referred to the appropriate authorities.

The departure AFSS/FSS station is responsible for SAR action until receipt of the destination station's acknowledgment for the flight notification message. This responsibility is then transferred to the destination station.

Benefits

Current operations are provided in the NAS.

Systems

Air Route Surveillance Radar - Model 1E (key system)

The Air Route Surveillance Radar - Model 1E (ARSR-1E) is a 1970s analog radar. It is a long-range radar system with a maximum detection range of 200 nm. The ARSR-1E is a surveillance system used to detect azimuth and slant range of en route aircraft operating between terminal areas. It also provides weather intensity data.

Air Route Surveillance Radar - Model 2 (key system)

The Air Route Surveillance Radar - Model 2 (ARSR-2) is a 1970s analog radar. It is a long-range radar system with a maximum detection range of 200 nm. The ARSR-2 is a surveillance system used to detect azimuth and slant range of en route aircraft operating between terminal areas. It also provides weather intensity data.

Air Route Surveillance Radar - Model 3 (key system)

The Air Route Surveillance Radar - Model 3 (ARSR-3) is a 1980s radar that provides primary long range surveillance data, including slant range and azimuth data. It processes the returns which includes demodulation, analog-to-digital conversion, moving target indicator function, sensitivity time control, range and azimuth gating, and digital target extraction - all of which are performed digitally (with the exception of the demodulation and analog-to-digital conversion). In addition, the ARSR-3 has a weather channel with associated processing to provide weather contour information in digital format.

Air Route Surveillance Radar - Model 4 (key system)

The Air Route Surveillance Radar - Model 4 (ARSR-4) is a three-dimensional, long-range, rotating phased array, primary surveillance radar with integrated height finder capability. It is part of the joint surveillance system (JSS) used in conjunction with ARSR-3 coverage as part of the nationwide air defense command surveillance network. In addition to functions peculiar to the military, the ARSR-4 performs the same basic functions of the ARSR-3, by providing primary long-range surveillance data, including slant range and azimuth data.

Air Traffic Control Beacon Interrogator - Model 4 (key system)

The Air Traffic Control Beacon Interrogator - Model 4 (ATCBI-4) is an air traffic control (ATC) beacon system that interrogates transponder-equipped aircraft. It is a secondary radar system that interrogates transponders, receives aircraft identification, and determines position data.

Air Traffic Control Beacon Interrogator - Model 5 (key system)

The Air Traffic Control Beacon Interrogator - Model 5 (ATCBI-5) is an air traffic control (ATC) beacon system that interrogates transponder-equipped aircraft. It is a secondary radar system that interrogates transponders, receives aircraft identification, and determines position data.

Air Traffic Control Beacon Interrogator - Model 6 (key system)

The Air Traffic Control Beacon Interrogator Model 6 (ATCBI-6) is a ground-based system that interrogates transponders, receives and processes replies from transponders, determines the range and azimuth to the aircraft, and forwards the information to appropriate air traffic control (ATC) automation systems. Replies provide identification and altitude data of the transponder.

Airport Surface Detection Equipment - Model 3 (key system)

Airport Surface Detection Equipment - Model 3 (ASDE-3) provides primary radar surveillance of aircraft and airport service vehicles on the surface movement area. ASDE-3 is installed at the busiest U.S. airports. Radar monitoring of airport surface operations (ground movements of aircraft and other supporting vehicles) provides an effective means of directing and moving surface traffic. This is especially important during periods of low visibility such as rain, fog, and night operations.

The ASDE-3 will undergo a SLEP to extend its service life through 2015 (see ASDE-3 SLEP), which will enable it to more effectively support AMASS (see) through this same time period.

Airport Surface Detection Equipment - Model 3 Workstation (key system)

Airport Surface Detection Equipment - Model 3 Workstation (ASDE-3 Workstation) displays ASDE-3 primary surveillance of aircraft and vehicles on the airport surface. The workstation is part of the ASDE-3 system; therefore, locations and schedules are identical to ASDE-3.

Airport Surveillance Radar - Model 11 (key system)

The Airport Surveillance Radar- Model 11 (ASR-11) is a digital, combined primary and secondary surveillance radar (SSR), short-range radar system with a 60 nautical mile (nmi) detection range for medium and small activity airports. The ASR-11 provides advanced digital primary radar including weather intensity surveillance with an integrated monopulse SSR system for use in the airport terminal area. The ASR-11 is used to detect and report the presence and location of an aircraft in a specific volume of airspace. The ASR-11 provides search radar surveillance coverage in controlled airspace primarily in terminal areas.

Airport Surveillance Radar - Model 7 (key system)

The Airport Surveillance Radar - Model 7 (ASR-7) is a short-range (60 nm) analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the Air Traffic Control Beacon Interrogator - Model 4 or Model 5 (ATCBI-4 or ATCBI-5) or Mode S. This system will be replaced by the ASR-11.

Airport Surveillance Radar - Model 8 (key system)

The Airport Surveillance Radar - Model 8 (ASR-8) is a short-range (60 nm), analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the Air Traffic Control Beacon Interrogator - Model 4 or Model 5 (ATCBI-4 or ATCBI-5) or Mode S.

Airport Surveillance Radar - Model 9 (key system)

The Airport Surveillance Radar - Model 9 (ASR-9) is a short range (60 nm) radar system for the airport terminal area. The ASR-9 processes the returns from aircraft targets, which includes demodulation, analog-to-digital conversion, range and azimuth gating, sensitivity timing control, and a moving target detection function. The moving target detector includes two-level weather contour processing, digital signal processing, correlation and interpolation processing, and surveillance processing. The ASR-9 has a separate weather channel with associated processing capable of providing six-level weather contours. The two-level weather contour processing associated with the moving target detector is only be used for backup. The six-level weather channel is primarily used to supplement Next Generation Weather Radar (NEXRAD) coverage. It is normally used in conjunction with Mode Select (Mode S) but it can accommodate an Air Traffic Control Beacon Interrogator Model 4/5 (ATCBI-4/5).

The ASR-9 will be upgraded/replaced with the ASR-9/Mode S SLEP (see separate mechanism) in the 2007-12 time frame.

Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) (key system)

The Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) (ASR-9/Mode S (SLEP)) mechanism provide the necessary technical refresh to extend the service life of the ASR-9 and Mode S through 2030. The ASTERIX upgrade has not been implemented, but will be implemented at a later date.

Airport Surveillance Radar, Military (key system)

The GPN-20 radar is a military short-range (60 nm) analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the TPX-42 military beacon (interrogate friend or foe, IFF). The GPN-20 is the military version of the FAAs ASR-7/8.

Automated Radar Terminal System - Model IIE (key system)

The Automated Radar Terminal System - Model IIE (ARTS IIE) provides radar data processing (RDP) and decision support tools to the controller in the terminal environment. Utilized at low to medium-size Terminal Radar Control (TRACONs) Facilities the ARTS IIE is capable of receiving input from up to 2 sensors, can process up to 256 tracks simultaneously, and support up to 22 displays. The ARTS IIE implements the Common ARTS software for improved performance maintenance efficiency. The radar data processing (RDP) software provides automated surveillance tracking and display processing. Included in the ARTS IIE software are decision support tools such as Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Mode C intruder alert, Converging Runway Display Aid (CRDA), and Controller Automation Spacing Aid (CASA).

Automated Radar Terminal System - Model IIIA (key system)

The Automated Radar Terminal System - Model IIIA (ARTS IIIA) provides radar data processing (RDP) and decision support tools to the controller in the terminal environment. Utilized at larger airports, ARTS IIIA is capable of receiving input from up to three sensors, can process up to 900 tracks simultaneously and support up to 36 displays. The RDP software provides automated surveillance tracking and display processing. Included in the ARTS IIIA software are decision support tools such as Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Mode C intruder alert, Converging Runway Display Aid (CRDA), Final Monitor Aid (FMA), and controller automation spacing aid.

Automated Radar Terminal System - Model IIIE (key system)

The Automated Radar Terminal System - Model IIIE (ARTS IIIE) consists of the hardware platform and software required providing radar data processing (RDP) and decision support tools to the controller in the terminal environment. The ARTS IIIE is used at consolidated Terminal Radar Approach Control (TRACON) facilities. The Common ARTS program provided an ARTS IIIE capable of receiving input from up to 15 sensors, the ability to process up to 10,000 tracks simultaneously, and support up to 223 displays. The RDP software provides automated surveillance tracking and display processing including mosaic display of radar data. Included in the ARTS IIIE software are decision support tools such as Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Mode C intruder alert, Converging Runway Display Aid (CRDA), Final Monitor Aid (FMA), and controller automation spacing aid.

Automated Radar Terminal System Color Display (key system)

The Automated Radar Terminal System (ARTS) Color Display (ACD) is a high performance, full function, color display that replaces the Full Digital ARTS Display (FDAD) and the Data Entry and Display Subsystem (DEDS). The ACD supports keyboard and trackball functions for the ARTS IIA, ARTS IIE, and ARTS IIIE. A primary and secondary radar data path to the ACD is provided by a radar gateway function incorporated in the event of a failure of either the ARTS IIE and ARTS IIIA processing systems.

Automated Radar Terminal System Software

Provides maintenace of the Automated Radar Terminal System Software (ARTS S/W) for ARTS IIE, ARTS IIIA and ARTS IIIE. Functions include radar data processing (RDP), Minimum Safe Altitude Warning (MSAW); controller automated spacing tool, Converging Runway Display Aid (CRDA), Final Approach Monitor (FMS), and other tools to assist the terminal and tower controllers to manage the air traffic in the terminal area.

Automated Radar Terminal System Software Modification (All Purpose Structured Eurocontrol Information Exchange, etc,)

Automated Radar Terminal System Software Modification (All Purpose Structured Eurocontrol Information Exchange (ASTERIX), etc,), (ARTS S/W Mod (ASTERIX, etc)). Modification to the ARTS software that will add capabilities including weather product integration on the displays, processing of ASTERIX formatted surveillance data, improved traffic management and surveillance data processing, Ground-Initiated Communications Broadcast (GICB), and terminal data link functionality.

Automatic Dependent Surveillance (Capstone) Ground Station

The Automatic Dependent Surveillance (Capstone) Ground Station (ADS (Cap) Ground Station) is a demonstration system used by the Capstone project under Safe Flight 21. It receives Global Positioning System (GPS)-derived aircraft four (4)-dimensional position data, aircraft identification, aircraft velocity, and other selected aircraft data for processing at ATC facilities, and transmits Traffic Information System - Broadcast (TIS-B) information on aircraft in areas of radar coverage (and other airspace status information when available) to properly to equipped aircraft, to support operational trials. These ground stations are located in remote locations in Alaska, and feed the Anchorage Air Route Traffic Control Center (ARTCC) automation system.

Digital Airport Surveillance Radar (key system)

The Digital Airport Surveillance Radar (DASR) provides advanced digital primary radar including weather intensity surveillance with an integrated mono-pulse Secondary Surveillance Radar (SSR) system for use in the airport terminal area. (Military version of ASR-11)

Digital Voice Recorder System (key system)

Provides modern digital voice recording devices used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

In Feburary 2004, the DVRS was upgraded with a 24-channel card, which replaced the 16-channel card. This minor upgrade, called DVR II, was not extended to the systems installed prior to February 2004.

Digital Voice Recorder System Replacement

The Digital Voice Recorder System Replacement (DVRS Replacement) is a modern digital system used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

Direct Access Radar Channel

The Direct Access Radar Channel (DARC) provides a back-up processing path to provide surveillance data to the displays in the event of a primary channel (Host Computer System (HCS) failure. The DARC path is a physically, logically and electrically separate processing path (with diverse hardware and software) from the primary Host Computer System (HCS) Radar Data Processing (RDP) paths. Thus DARC provides a tertiary path, to keep radar data on the controller''s displays, should both HCS RDP paths be disabled for any reason. The DARC provides radar data processing, very limited flight data processing, but with significantly less functionality than the HCS. Basically, DARC serves as a lifeboat should both HCS processing paths become disabled.

Display System Replacement (key system)

The Display System Replacement (DSR) provides continuous real-time, automated support to air traffic controllers for the display of surveillance, flight data and other critical control information. This information is processed by the Host and Oceanic Computer System Replacement (HOCSR) and the Enhanced Direct Access Radar Channel (EDARC) subsystems. The DSR provides controller workstations, displays, and input/output devices and a communications infrastructure to connect the DSR with external processing elements of the en route ATC automation system.

Display System Replacement Console Reconfiguration Monitor Replacement (key system)

Display System Replacement Console Reconfiguration Monitor Replacement (DSR CRMR) replaces the R-position cathode ray tube (CRT) with a 20 x 20-inch square flat panel liquid crystal displays (LCD). Replacement of the large CTR with a LCD will free up space in the rear of the DSR console for relocating Voice Switch Control System (VSCS) equipment. Relocating the VSCS Electronic Module (VEM) and the VSCS Training and Backup System (VTABS)--formerly known as VEM/PEM)--is part of this activity and will improve equipment efficiency, packaging and the productivity of maintenance personnel.

Emergency Locator Transmitter (key system)

An Emergency Locator Transmitter (ELT) is a device that transmits a signal when activated by the crash of the airplane. ELT aids search and rescue (SAR) efforts in locating downed aircraft. This is the minimum function required by the Federal Aviation Regulation (FAR) Part 91.207 as of July 2000. There is a new standard for the ELT, TSO-126, which in 2009 will make the ELT transmit both on 406 Mhz, to communicate with satellite SAR services, and 121.5 MHz homing beacon which is monitored by Civil Air Patrol.

Emergency Locator Transmitter - Global Positioning System

An Emergency Locator Transmitter - Global Positioning System (ELT - GPS) is a device carried on an aircraft that transmits the unique identification of the transmitter and the position of the aircraft (determined by the Global Positioning System) when activated by the crash of the aircraft. Supported but not required in the Code of Federal Regulations (CFR) Part 91.207 as of July 2000.

Emergency Locator Transmitter - Satellite (key system)

An Emergency Locator Transmitter - Satellite (ELT - SAT) is a device carried on an aircraft that transmits the unique identification of the transmitter when activated by the crash of the aircraft. Supported but not required in the Code of Federal Regulations (CFR) Part 91.207 as of July 2000.

Emergency Voice Communications System (key system)

The Emergency Voice Communications System (EVCS) is located at Headquarters (HQ), Regional Offices, several Air Route Traffic Control Centers (ARTCCs), Terminal Radar Approach Control (TRACON) facilities, and other selected sites. EVCS uses two (2) dedicated Federal Telecommunications Service 2001 (FTS2001) dial access channels at most FAA locations. Dedicated dial lines using the Public Switched Telephone Network (PSTN) are used at locations not having direct access to FTS2001. Supports HQ and Regional Communications Command Centers'' functions for accident and incident reports, hijacks, aircraft crashes, aviation security matters, military activities, natural disasters, etc.

En Route Communications Gateway (key system)

The En Route Communications Gateway (ECG) replaces PAMRI and provides a modernized LAN-based infrastructure capable of accommodating ERAM with minimal modifications. The PAMRI functions to be replaces include providing communications interfaces to external systems located in other ARTCCs, TRACONs, AFSSs, ATCSCC, NORAD, US Law Enforcement, US Customs, Military Base Operations, and international ACCs. Other interfaces include the FDIO Central Control Unit, which exchanges FDIO data with FAA and DOD facilities, and the NADIN Concentrator, which exchanges data through the NADIN PSN with the the M1FC via WMSCR. ECG increases the number of external interfaces to radars from 24 to 36. ECG provides internal interfaces between HCS and DARC (or EBUS) and between HCS and traffic flow processors such as ETMS and DSP. ECG includes a Monitor and Control subsystem and a display for monitoring up to two dozen radars--called the Random Access Plan Position Indicator (RAPPI).

The operational components of ECG consist of a front end processor (communications and surveillance interfaces), two gateway processors (internal connectivity to HCS and DARC/EBUS), and separate LANs that communicate between the front end and gateway processors on the primary channel and between the front end and gateway processors on the backup channel. The primary data path, consisting of the ECG primary gateway and the HCS, operate on separate hardware platforms. However, the backup data path, consisting of the ECG backup gateway and the EBUS, will operate on the same hardware platform--the ECG gateway platform. This processor, with both functions performed therein, is renamed to the Backup Interface Processor (BIP). In essence, a single processor operates on the backup channel, supporting both the ECG gateway function and the EBUS function. These two functions will remain, however, as two mechanisms in the NAS architecture.

Enhanced Back-up Surveillance

The Enhanced Back-Up Surveillance (EBUS) system replaces the DARC system in use at the 20 Air Route Traffic Control Centers (ARTCC) in the contiguous United States (CONUS), the William J. Hughes Technical Center (WJHTC), and the FAA Academy (FAAAC). The EBUS design employs the existing FAA-certified software of the Microprocessor En Route Automated Radar Tracking System (Micro-EARTS) application to provide radar data processing (RDP) services for the replacement legacy backup system. Micro-EARTS provides key capabilities not supported by the DARC legacy system it replaces, among which are the safety functions of Conflict Alert (CA), Mode-C Intruder (MCI), and Minimum Safe Altitude Warning (MSAW). EBUS also provides Next Generation Radar (NEXRAD) weather data to R-position users via the DSR Backup Communications Network (BCN). EBUS makes the R-position functionality on the backup channel more comparable to that of the primary channel.

The EBUS software (Micro EARTS) and the ECG backup gateway software will share the same hardware platform such that both software functions will reside in the same ECG backup gateway hardware platform.

Enhanced Terminal Voice Switch (key system)

The Enhanced Terminal Voice Switches (ETVS) are installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) facilities with more than four air traffic controller positions. The ETVS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The ETVS (installed in the ATCT) provides the ATC operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the ETVS.

The ETVS (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within a TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the ETVS.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate ETVS systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Fixed Position Surveillance - Model 117

The Fixed Position Surveillance - Model 117 (FPS-117) radar is a joint-use military surveillance system used by the FAA to detect slant range and azimuth of en route aircraft. These radars are located in Alaska (12) and Hawaii (1), and are expected to be sustained until at least 2020.

Fixed Position Surveillance Model 20 Series

The Fixed Position Surveillance Model 20 Series (FPS-20 Series) is a military primary radar of various models (FPS-20A, FPS-64, FPS-66A, FPS-67/A/B, and ARSR-60M) used by the FAA to detect slant range and azimuth of en route aircraft operating between terminals in the continental United States. Each of the different radar models is a similar variation of the original FPS-20 military radar.

Full Digital Automated Radar Terminal System Display (key system)

Full Digital ARTS Display (FDAD) is the fully digital ARTS display system that provides the display and data input devices for terminal controllers using ARTS IIIE and ARTS IIIA. The FDAD can work in analog video time share mode or full digital mode. The present application is analog video time share mode.

Heating, Ventilation and Air Conditioning - Long-Range Radar (key system)

The Heating, Ventilation and Air Conditioning - Long-Range Radar (HVAC - LRR) mechanism provides the systems to maintain the temperature and relative humidity within the facility at acceptable levels for LRR system operation or personnel comfort as required. This includes filtering of air to Occupational Safety and Health Administration (OSHA) requirements.

High Frequency Airborne Radios (key system)

High Frequency (HF) Airborne Radios are analog (HF multi-channel radio transceivers operating in the 2 - 30 Mhz frequency band installed in airborne commercial, cargo, and military aircraft transiting the oceanic, en route, terminal, or flight service station airspace domains. These transceivers are typically used in transoceanic applications.

High Frequency Ground Radios (key system)

High Frequency (HF) Ground Radios are analog HF radio devices operating in the 2 - 30 Mhz frequency band, which may be single channel transmitters and receivers or multi-channel transceivers. These radio devices are installed at oceanic and en route facilities and used to support tactical air traffic control (ATC) voice communications between a ground controller and a pilot in an aircraft in the oceanic domain. Additionally, these devices are also installed at regional facilities and used to support voice command and control communications /coordination in emergency or during disaster recovery situations occurring in the NAS.

Host Computer System (key system)

The Host Computer System (HCS) receives and processes surveillance reports, and flight plan information. The HCS sends search/beacon target, track and flight data, surveillance and alphanumeric weather information, time data, traffic management advisories and lists to the (Display System Replacement) DSR. The HCS associates surveillance-derived tracking information with flight-planning information. The DSR sends requests for flight data, flight data updates, and track control messages to the HCS. HCS-generated display orders are translated for use within the DSR workstation. While radar data processing is distributed among the terminal and En Route computer resources, the HCS performs virtually all of the flight data processing for its entire geographical area of responsibility. Every tower (ATCT) and terminal radar approach control (TRACON) relies exclusively on its parent HCS for flight data.

The HCS also runs algorithms that perform aircraft to aircraft (conflict alert) and aircraft to terrain (Minimum Safe Altitude Warning) separation assurance. The HCS algorithms provide visual and audible alerting to the controller when conflicts are identified.

The HCS presently supplies real time surveillance, flight data and other information to several decision support tools housed in collocated outboard processors connected via two-way high bandwidth links to the HCS and DSR. These are the (User Request Evaluation Tool, (URET), and the Traffic Management Advisory (TMA. URET performs probing of tentative flight plan changes to determine their viability. TMA provides sequencing and spacing information to align the aircraft in En Route airspace for approach.

Host Computer System / Oceanic Computer System Replacement (key system)

The Host Computer System & Oceanic Computer System Replacement (HCS/OCSR--HOCSR) was implemented because of potential Y2K hardware issues with previous hardware. Accordingly, HCS/OCSR provided a new hardware platform, new peripherals (printers and Keyboard Display Video Terminals--KVDT), a new Direct Access Storage Device (DASD), and new OS-370 software extensions to control the new hardware using legacy NAS software applications. Hardware was replaced in both the En Route and Anchorage Oceanic automation environments. HCS/OCSR did not modify the legacy software functions of either the HCS system (e.g., flight data processing, radar data processing) or the Ocean Display and Planning System (ODAPS) automation systems (e.g., filght data processing). Likewise, HCS/OCSR did not impact HID NAS LAN, URET, DSR or PAMRI.

Phase 1 and 2 (mainframe and software extension replacements) were completed prior to 2000. Phase 3 (DASD replacement) was completed in 2003. Phase 4 (peripheral replacement) will be completed in 2004. Enhancement planned for 2005 and beyond were cancelled as they are overtaken by ERAM. Each phase has its own waterfall, and consequently no waterfall can be provided in the Location section below.

Integrated Communications Switching System Type I (key system)

The Integrated Communications Switching System Type I (ICSS I) are installed at Airport Traffic Control Towers (ATCT), Terminal Radar Approach Control (TRACON) facilities, and Automated Flight Service Stations (AFSS).

The ICSS I (installed in the ATCT) provides the air traffic control (ATC) operational ground-ground voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/air traffic control system command center (ATCSCC) specialists. Ground-air radio connectivity between ATCT controllers and pilots is also supported by the ICSS I.

The ICSS I (installed in the TRACON) provides the ATC operational ground-ground voice communications interconnectivity between controllers within TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Ground-air radio connectivity between TRACON controllers and pilots is also supported by the ICSS I.

The ICSS I (installed in the AFSS) provides the ATC operational ground-ground voice communications interconnectivity between specialists within an AFSS (intercom), interconnectivity between specialists in separate AFSSs (interphone), and interconnectivity between Flight Service Station (FSS) specialists and Air Route Traffic Control Center (ARTCC) controllers/TRACON controllers/ATCT controllers/Air Traffic Control System Command Center (ATCSCC) specialists. Ground-air radio connectivity between AFSS specialists and pilots is also supported by the ICSS I.

Integrated Communications Switching System Type II (key system)

The Integrated Communications Switching System Type II (ICSS II) are installed at Airport Traffic Control Towers (ATCT), Automated Flight Service Stations(AFSS), and Terminal Radar Approach Control (TRACON) facilities.

The ICSS II (installed in the ATCT) provides the air traffic control (ATC) operational ground-ground voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Ground-air radio connectivity between ATCT controllers and pilots is also supported by the ICSS II.

The ICSS II (installed in the TRACON) provides the ATC operational ground-ground voice communications interconnectivity between controllers within TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC)) controllers/ Flight Service Station (FSS) specialists/air traffic control system command center (ATCSCC) specialists. Ground-air radio connectivity between TRACON controllers and pilots is also supported by the ICSS II.

Integrated Communications Switching System Type III (key system)

The Integrated Communications Switching System Type III (ICSS III) is installed at Automated Flight Service Stations (AFSS). The ICSS III (installed in the AFSS) provides the air traffic control (ATC) operational ground-to-ground (G/G)voice communications interconnectivity between specialists within an AFSS (intercom), interconnectivity between specialists in separate AFSSs (interphone), and interconnectivity between Flight Service Station (FSS) specialists and Air Route Traffic Control Center (ARTCC) controllers/Terminal Radar Approach Control (TRACON) controllers/ATCT controllers/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between AFSS specialists and pilots is also supported by the ICSS III.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS II systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Leased Inter-facility National Airspace System Communication System

The Leased Inter-facility National Airspace System Communication System (LINCS) provides transmission channels of various industry-standard types between any specified end points, used to satisfy all FAA operational and some administrative telecommunication requirements.

Low-Density Radio Communications Link (key system)

The Low-Density Radio Communications Link (LDRCL) is an FAA owned Low-Density Radio Communications Link (LDRCL) satisfies short-haul, low-density communication requirements. It provides user access (via tail circuits) to a Radio Communications Link (RCL) site or connectivity between two operational facilities

Microprocessor-En Route Automated Radar Tracking System (key system)

The Microprocessor-En Route Automated Radar Tracking System (Micro-EARTS) is a radar processing system implemented with Commercial Off-the-Shelf (COTS) equipment, for use in both En Route and Terminal environments. It provides single sensor and a mosaic display of traffic and weather using long- and short-range radars. At Anchorage, Alaska, Micro-EARTS also provides Automatic Dependent Surveillance-Broadcast (ADS-B) surveillance and display. Micro-EARTS interfaces with multiple types of displays, including Display System Replacement (DSR), Digital Bright Radar Indicator Tower Equipment (DBRITE), and the flat panel tower controller displays.

Multi-Mode Digital Radios

Multi-Mode Digital Radios (MDRs) are ground-based Very High Frequency (VHF) air-traffic-control radios that can operate in several configurations: 1) analog voice with 25kHz channel spacing; 2) analog voice with 8.33 kHz channel spacing; and 3) VHF Data Link (VDL) Mode-3 which consists of two-way digital voice and data communication.

Operational and Supportability Implementation System (key system)

Operational and Supportability Implementation System (OASIS): The capabilities provided by the OASIS include alphanumeric and graphic weather product acquisition and display, flight plan processing, search and rescue services, and law enforcement support. The OASIS provides a real-time, multi-user, computer-based system that provides current weather information, forecast weather information, Notice to Airmen (NOTAM) information, and flight planning.

OASIS also supports flight service specialists at International Automated Flight Service Stations (IAFSS) that provide services associated with aircraft transiting the oceans.

Operational and Supportability Implementation System - Work Station (key system)

The Operational and Supportability Implementation System - Work Station (OASIS W/S) is a Windows-based PC located at each specialist position. It includes COTS software applications to provide the AFSS specialist with an integrated view of flight, alphanumeric, and graphic weather data. Pre-Flight and in-flight service functions are also available from these workstations.

Peripheral Adapter Module Replacement Item (key system)

The Peripheral Adapter Module Replacement Item (PAMRI) is an interface peripheral to the HOCSR. It provides a conduit through which the HOCSR receives and exchanges data, primarily radar data, flight data and interfacility data. The PAMRI converts communication protocols and translates data formats so the Host and EDARC can communicate with external devices.

Power System - Long-Range Radar (key system)

The Power System - Long-Range Radar (Pwr Sys - LRR) mechanism provides conditioning of commercial power, including uninterruptible power systems (UPS), to eliminate voltage dropouts, surges, and voltage sags caused by sources outside the facility. Power distribution, grounding, bonding and shielding of electrical system within the facility is also part of the Pwr Sys - LRR.

Radar Automated Display System (key system)

The Radar Automated Display System (RADS) is the Air Traffic Controller workstation for the Automated Radar Terminal System Model IIE (ARTS IIE).

Radio Communication Link (key system)

Radio Communication Link (RCL) is an integrated voice and data microwave transmission system designed to provide the FAA with cost effective and reliable service for its high capacity NAS communications routes. RCL interconnects air route traffic control center (ARTCC) facilities with long range radar installations and other air traffic control (ATC) facilities.

Radio Control Equipment (key system)

Radio Control Equipment (RCE), located at both ATC facilities and remote communication sites, control the operation of remotely located ground to air Very High Frequency/Ultra High Frequency (VHF/UHF) radios used by air traffic controllers to communicate with pilots. RCE interfaces with the voice switch at the ATC facility, telephone landlines, and ground to air radios at the En Route Remote Communications Air/Ground (RCAG) sites, Terminal Remote Transmitter/Receiver (RTR) sites, and Flight Service Station Remote Communications Outlet (RCO) sites.

Rapid Deployment Voice Switch Type I (key system)

The Rapid Deployment Voice Switch Type I (RDVS I) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS I (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the RDVS I. The RDVS I (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the RDVS I.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS I systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Rapid Deployment Voice Switch Type II (key system)

The Rapid Deployment Voice Switch Type II (RDVS II) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS II (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the RDVS II. The RDVS II (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the RDVS II.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS II systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Rapid Deployment Voice Switch Type IIA (key system)

The Rapid Deployment Voice Switch Type IIA (RDVS IIA) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS IIA (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. The RDVS IIA also supports air-to-ground (A/G) radio connectivity between ATCT controllers and pilots. The RDVS IIA (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between TRACON controllers and pilots is also supported by the RDVS IIA.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS IIA systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Remote Automated Radar Terminal System (ARTS) Color Display (key system)

Remote Automated Radar Terminal System Color Display (R-ACD) Description The Remote - Automated Radar Terminal System (ARTS) Color Display (ACD) is a high performance, full function, and color display providing air traffic controllers with the functionality of the Digital Bright Radar Indicator Tower Equipment (DBRITE). This display supports keyboard and trackball functions for the ARTS II, ARTS IIE, and ARTS IIIE. A radar gateway function will be incorporated to provide a primary and secondary radar data path to the R-ACD in the event of failure of both the ARTS II and ARTS IIIA processing systems.

Satellite Communication Airborne Radios

The Satellite Communication (SATCOM) airborne radios are transceivers installed in commercial, cargo, and military aircraft transiting in the National Airspace System (NAS) and are used as an alternate means of voice communications between pilots in aircraft and ground controllers. These transceivers are typically used in transoceanic applications.

Satellite Communication Ground Radios

Satellite Communications (SATCOM) Ground Radios are transceivers installed at oceanic and en route facilities to support an alternative means of tactical air traffic control (ATC) voice communications between ground controllers and pilots in aircraft. These transceivers are typically used in transoceanic applications. These transceivers are also installed at regional facilities and used as an alternate means of communications in case of total ground communications failure or between locations in mountainous terrain or where other means of communications are not possible (e.g., Alaska).

Oceanic air to ground satellite communications are provided via a communications service provider. The FAA currently has no plans to develop or implement its own air to ground SATCOM ground radios.

Small Tower Voice Switch (key system)

The Small Tower Voice Switch (STVS) is installed in small Airport Traffic Control Towers (ATCT) and in Flight Service Stations (FSS). The basic STVS has four operator positions. The STVS provides the Air Traffic Control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and Air Route Traffic Control Center (ARTCC) controllers/ Terminal Radar Approach Control (TRACON) controllers/FSS specialists/air traffic control system command center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between

ATCT controllers and pilots is also supported by the STVS. The STVS (installed in the FSS) provides the ATC operational G/G voice communications interconnectivity between specialists within an FSS (intercom), interconnectivity between specialists in separate FSSs (interphone), and interconnectivity between FSS specialists and Air Route Traffic Control Center (ARTCC) controllers/Terminal Radar Approach Control (TRACON) controllers/ATCT controllers/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground radio connectivity between FSS specialists and pilots is also supported by the STVS.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate STVS systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Standard Terminal Automation Replacement System (key system)

The Standard Terminal Automation Replacement System (STARS) processes primary and secondary radar information to acquire and track data points to display aircraft position for controllers. STARS provides safety tools such as, conflict alert (CA), Mode C intruder (MCI), final monitoring aid (FMA), Minimum Safe Altitude Warning (MSAW), Converging Runway Display Aid (CARDA), and Controller Automated Spacing Aid (CASA). Also, STARS provides the capability to implement the following enhancements: improved radar processing, Global Positioning System (GPS) compatibility, adaptive routing, Center Terminal Radar Approach Control (TRACON) Automation System (CTAS), data link implementation, improved weather display, and better utilization of traffic management information.

Standard Terminal Automation Replacement System Early Display Configuration

The Standard Terminal Automation Replacement System, Early Display Configuration (STARS EDC) provides STARS workstations at a limited number of ARTS IIIA facilities to replace aging DEDS and provide validation of the STARS workstation design before the complete STARS is implemented. STARS EDC will include updates to ARTS software for life cycle maintenance, additional human-machine interface (HMI) requirements for both tower and Terminal Radar Approach Control (TRACON), and Automated Radar Terminal System Model IIIE (ARTS IIIE) human factors validation.

Standard Terminal Automation Replacement System Terminal Controller Workstation (key system)

The Standard Terminal Automation Replacement System Terminal Controller Workstation (STARS TCW) provides the interface between the Terminal Radar Approach Control (TRACON) controller and the STARS processing unit.

Surveillance Processor (Safe Flight 21)

The Surveillance Processor (Safe Flight 21) is a demonstration system that receives, processes, and distributes surveillance data between Safe Flight 21 (SF-21) architectural elements to support operational trials. The processor receives surveillance data from various sources, including surveillance sensors, Automatic Dependent Surveillance-Broadcast (ADS-B) systems, multilateration systems, Air Traffic Control (ATC) automation systems, and flight plan processing systems. The processor fuses the various surveillance data to create aircraft track data, which is distributed to various SF-21 architectural elements. One of the capabilities supported by the processor is the processing and distribution of Traffic Information Services - Broadcast (TIS-B) information to ADS (SF-21) Ground Stations, for subsequent transmission to aircraft.

Ultra High Frequency Airborne Radios (key system)

The Ultra High Frequency Avionics (UHF Avionics) are analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225-400 MHz frequency band, which are multi-channel transceivers, installed in an airborne military platform. These airborne devices support the tactical two-way voice communications/ coordination between the military pilot in the military aircraft and the controller on the ground.

Ultra High Frequency Ground Radios (key system)

Ultra High Frequency (UHF) Ground Radios are analog UHF amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 Mhz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and flight service station domains.

Ultra High Frequency Ground Radios - Replacement (key system)

The Ultra High Frequency Ground Radios - Replacement (UHF Ground Radios - Repl) mechanism represents analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 MHz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and Flight Service Station domains.

Very High Frequency / Ultra High Frequency Emergency Communications Transceivers - Terminal (key system)

Very High Frequency / Ultra High Frequency Emergency Communications Transceivers - Terminal (VHF/UHF ECT - Terminal) are analog VHF and UHF transceivers operating in either the 118 - 137 Mhz or 225 - 400 Mhz frequency bands. These transceivers are used in the terminal domain as emergency communications.

Very High Frequency Airborne Radios (key system)

Very High Frequency (VHF) Airborne Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 Mhz frequency band which are multi-channel transceivers installed in an airborne platform (e.g., commercial, cargo, and general aviation aircraft). These airborne devices support the tactical two-way voice communications/coordination between the pilot in the aircraft and the controller on the ground.

Very High Frequency Ground Radios (key system)

Very High Frequency (VHF) Ground Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 MHz frequency band which are single-channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the pilot in commercial, cargo, or general aviation aircraft in the oceanic, en route (i.e., ARTCC), terminal (i.e., TRACON/tower), and flight service station domains. Additionally, there are analog VHF frequency modulation (VHF - FM) radio devices operating in the 161 - 174 MHz frequency band that are multi-channel transceivers. These transceivers are used by flight inspection, aviation security, and airway facility specialists supporting local airport operations and maintenance or to perform their operational maintenance mission in support of the NAS. However, these same VHF-FM transceivers are also used to support the resolution of emergency situations or establish a level of voice command and control communications/coordination during disaster recovery.

Very High Frequency Mobile Radios

Very High Frequency (VHF) Mobile Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 Mhz frequency band which are multi-channel transceivers installed in surface vehicles (e.g., "follow-me," maintenance, administrative, and snow-removal vehicles). These devices support the tactical two-way voice communications/coordination between the operators in the vehicles and the tower controllers or airline operations personnel.

Very High Frequency Multi-Mode Airborne Radios (key system)

Very High Frequency Multi-Mode Airborne Radios (VHF MM Airborne Radios) refers to an airborne radio operating in the very high frequency (VHF) range capable of operating in the following modes: (1)) analog voice (i.e., 25 kHz spacing for use in the United States and other similarly equipped countries); (2) VHF Digital Link Mode 2 (VDL Mode-2) (two-way digital data transmission); (3) VHF Digital Link Mode 3 (VDL Mode-3), (integrated two-way digital voice/data transmission); and (4) analog voice (i.e., 8.33 kHz spacing for use in Europe and other similarly equipped countries).

Voice Switching and Control System (key system)

The Voice Switching and Control System (VSCS) is installed in the Air Route Traffic Control Center (ARTCC). The VSCS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The VSCS provides the Air Traffic Control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ARTCC (intercom), interconnectivity between controllers in separate ARTCCs (interphone), and interconnectivity between ARTCC controllers and Terminal Radar Approach Control (TRACON) controllers/Airport Traffic Control Tower (ATCT) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ARTCC controllers and pilots is also supported by the VSCS.

Voice Switching and Control System Modification (Control System Upgrade)

The VSCS control system upgrade (VCSU) is a replacement of the Tandem computers that perform the logical switching and control for the VSCS system. The replacement of Tandem computers is for all ARTCCs including three spares.

Voice Switching and Control System Modification (Technological Refresh)

The Tech Refresh for VSCS is a service life extension. The Tech Refresh encompasses workstation upgrade, video display monitor, control equipment power, VSCU supportability, control shelf power supply, and software development demonstration system expansion.

Voice Switching and Control System Training and Backup Switches

Voice Switching and Control System Training and Backup Switch (VTABS) was developed to meet AT requirements for a separate standalone VSCS Backup and Training System. VTABS can be configured as a 50-position switch with the capability to support air traffic operations in the event of VSCS failure, hardware and software maintenance or power loss.

Western Electric Company Model 301 Voice Switch

The Western Electric Company Model 301 Voice Switch (WECO 301) supports air-to-ground communications between air traffic controllers and pilots and ground-to-ground communications among air traffic control (ATC) personnel.

People

Flight Service Specialist

A Flight Service Specialist performs the following activities:

* Provide services to aircraft in flight and during the pre-flight phase,

* Monitoring and restoration of NAVAID; Issuing local airport advisories,

* Relaying ATC clearances, advisories or requests,

* Issuing military flight advisory messages,

* Receiving and issuing NOTAMS,

* Assisting is search and rescue communication searches,

* Activating and closing flight plans,

* Making unscheduled broadcasts,

* Soliciting and issuing PIREPS,

* Presenting pilot weather briefings to airborne aircraft,

* Locating lost aircraft,

* Recording aircraft contacts,

* Providing weather advisories and flight plan services,

* Providing hazardous area reporting services, and

* Keeping airmen and weather information current.

Ground Controller

A Ground Controller performs the following activities: Ensure separation; Control vehicles as well as aircraft on movement areas other than active runways Initiate control instructions; Monitor and operate communications equipment; Utilize tower radar display(s); Utilize alphanumerics; Assist the tower associate controller with coordination; Scan tower cab environment; Ensure computer entries and strip marking are completed for instructions or clearances issued or received; Process and forward flight plan information; Perform any functions of the tower team which will assist in meeting situation objectives; Coordinate with local control for safe and efficient use of runways and movement areas.

Local Controller

A Local Controller performs the following activities: Ensure separation; Control active runways; Initiate control instructions; Monitor and operate communications equipment; Utilize tower radar display(s); Utilize alphanumerics; Assist the tower associate controller with coordination; Scan tower cab environment; Ensure computer entries and strip marking are completed for instructions or clearances issued or received; Process and forward flight plan information; Perform any functions of the tower team which will assist in meeting situation objectives; Coordinate with ground control for safe and efficient use of runways and movement areas.

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Radar Controller

A Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate automated handoffs; Assist the radar associate controller with non-automated handoff actions when needed; Assist the radar associate controller in coordination when needed; Scan radar display; Correlate with flight progress strip information; Ensure computer entries are completed on instructions or clearances you issue or receive; Ensure strip marking is completed on instructions or clearances you issue or receive.

Rescue Coordination Center Specialist

Rescue Coordination Center People consist of personnel from the United States Coast Guard and the United States Air Force who receive information about overdue or missing aircraft from the FAA and coordinate the search and rescue activities within their respective regions.

Interfaces

Air Route Surveillance Radar - Model 1E — (Surveillance Data) → Air Traffic Control Beacon Interrogator - Model 6

The ATCBI-6 correlates return signals from the primary radar with beacon signals and transmits the data to the automation system.

Air Route Surveillance Radar - Model 1E — (Surveillance Data) → En Route Communications Gateway

The ARSR-1 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ECG interface, which then routes the data to the automation equipment for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 1E — (Weather Data) → En Route Communications Gateway

The ARSR-1E long-range radar provides detected weather data to the ECG for processing at en route facilities.

Air Route Surveillance Radar - Model 1E — (Surveillance Data) → Peripheral Adapter Module Replacement Item

The ARSR-1 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the PAMRI interface, which then routes the data to the HCS and DARC for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 1E — (Weather Data) → Peripheral Adapter Module Replacement Item

The ARSR-1E long-range radar provides detected weather data to the PAMRI for processing at en route facilities.

Air Route Surveillance Radar - Model 2 — (Surveillance Data) → Air Traffic Control Beacon Interrogator - Model 6

The ATCBI-6 correlates return signals from the primary radar with beacon signals and transmits the data to the automation system.

Air Route Surveillance Radar - Model 2 — (Surveillance Data) → En Route Communications Gateway

The ARSR-2 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ECG interface, which then routes the data to the automation equipment for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 2 — (Weather Data) → En Route Communications Gateway

The ARSR-2 long-range radar provides detected weather data to the ECG for processing at en route facilities.

Air Route Surveillance Radar - Model 2 — (Surveillance Data) → Peripheral Adapter Module Replacement Item

The ARSR-2 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the PAMRI interface, which then routes the data to the HCS and DARC for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 2 — (Weather Data) → Peripheral Adapter Module Replacement Item

The ARSR-2 long-range radar provides detected weather data to the PAMRI for processing at en route facilities.

Air Route Surveillance Radar - Model 3 — (Surveillance Data) → Air Traffic Control Beacon Interrogator - Model 6

The ATCBI-6 correlates return signals from the primary radar with the beacon signals and transmits the data to the automation system for tracking and display.

Air Route Surveillance Radar - Model 3 — (Surveillance Data) → En Route Communications Gateway

The ARSR-3 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ECG interface, which then routes the data to the automation equipment for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 3 — (Weather Data) → En Route Communications Gateway

The ARSR-3 long-range radar provides detected weather data to the ECG for processing at en route facilities.

Air Route Surveillance Radar - Model 3 — (Surveillance Data) → Microprocessor-En Route Automated Radar Tracking System

The ARSR-3 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the Micro-EARTS for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 3 — (Surveillance Data) → Peripheral Adapter Module Replacement Item

The ARSR-3 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the PAMRI interface, which then routes the data to the HCS and DARC for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 3 — (Weather Data) → Peripheral Adapter Module Replacement Item

The ARSR-3 long-range radar provides detected weather data to the PAMRI for processing at en route facilities.

Air Route Surveillance Radar - Model 4 — (Surveillance Data) → Air Traffic Control Beacon Interrogator - Model 6

The ATCBI-6 correlates return signals from the primary radar with the beacon signals and transmits the data to the automation system for tracking and display.

Air Route Surveillance Radar - Model 4 — (Surveillance Data) → Automated Radar Terminal System - Model IIE

The ARSR-4 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.

Air Route Surveillance Radar - Model 4 — (Weather Data) → Automated Radar Terminal System - Model IIE

The ARSR-4 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIE for processing and use in controlling air traffic in the CERAP domain (Guam).

Air Route Surveillance Radar - Model 4 — (Surveillance Data) → En Route Communications Gateway

The ARSR-4 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ECG interface, which then routes the data to the automation equipment for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 4 — (Weather Data) → En Route Communications Gateway

The ARSR-4 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ECG for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 4 — (Surveillance Data) → Microprocessor-En Route Automated Radar Tracking System

The ARSR-4 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the Micro-EARTS for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 4 — (Weather Data) → Microprocessor-En Route Automated Radar Tracking System

The ARSR-4 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the Micro-EARTS for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 4 — (Surveillance Data) → Peripheral Adapter Module Replacement Item

The ARSR-4 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the PAMRI interface, which then routes the data to the HCS and DARC for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 4 — (Weather Data) → Peripheral Adapter Module Replacement Item

The ARSR-4 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the PAMRI for processing and use in controlling air traffic in the en route domain.

Air Traffic Control Beacon Interrogator - Model 4 — (Surveillance Data) → Air Route Surveillance Radar - Model 1E

The ARSR-1 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports via a CD-2, which sends the data to an automation system for tracking and display.

Air Traffic Control Beacon Interrogator - Model 4 — (Surveillance Data) → Air Route Surveillance Radar - Model 2

The ARSR-2 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports via a CD-2, which sends the data to an automation system for tracking and display.

Air Traffic Control Beacon Interrogator - Model 4 — (Surveillance Data) → Airport Surveillance Radar - Model 9

The ASR-9 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports and then sends the data to an automation system for tracking and display.

Air Traffic Control Beacon Interrogator - Model 4 — (Surveillance Data) → Automated Radar Terminal System - Model IIE

The ATCBI-4 sends aircraft identification, position, and altitude to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.

Air Traffic Control Beacon Interrogator - Model 4 — (Surveillance Data) → Automated Radar Terminal System - Model IIIE

The ATCBI-4 sends aircraft identification, position, and altitude to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.

Air Traffic Control Beacon Interrogator - Model 4 — (Surveillance Data) → Microprocessor-En Route Automated Radar Tracking System

The ATCBI-4 sends aircraft identification, position, and altitude to the Micro-EARTS for processing and use in controlling air traffic in the terminal domain from a CERAP.

Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) → Air Route Surveillance Radar - Model 1E

The ARSR-1 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports via a CD-2, which sends the data to an automation system for tracking and display.

Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) → Air Route Surveillance Radar - Model 2

The ARSR-2 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports via a CD-2, which sends the data to an automation system for tracking and display.

Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) → Air Route Surveillance Radar - Model 3

The ARSR-3 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports and then sends the data to an automation system for tracking and display.

Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) → Air Route Surveillance Radar - Model 4

The ARSR-4 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports and then sends the data to an automation system for tracking and display.

Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) → Airport Surveillance Radar - Model 9

The ASR-9 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports and then sends the data to an automation system for tracking and display.

Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) → Automated Radar Terminal System - Model IIE

The ATCBI-5 sends aircraft identification, position, and altitude to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.

Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) → Automated Radar Terminal System - Model IIIA

The ATCBI-5 sends aircraft identification, position, and altitude to the ARTS IIIA for processing and use in controlling air traffic in the terminal domain.

Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) → Automated Radar Terminal System - Model IIIE

The ATCBI-5 sends aircraft identification, position, and altitude to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.

Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) → Microprocessor-En Route Automated Radar Tracking System

The ATCBI-4 sends aircraft identification, position, and altitude to the Micro-EARTS for processing and use in controlling air traffic in the en route domain, as well as in terminal domains associated with CERAPs.

Air Traffic Control Beacon Interrogator - Model 6 — (Surveillance Data) → En Route Communications Gateway

The ATCBI-6 sends aircraft identification, position, and altitude to the ECG, which then routes the data to the HCS and DARC for processing and use in controlling air traffic in the en route domain.

Air Traffic Control Beacon Interrogator - Model 6 — (Surveillance Data) → Peripheral Adapter Module Replacement Item

The ATCBI-6 sends aircraft identification, position, and altitude to the PAMRI, which then routes to the HCS or DARC for processing and use in controlling air traffic in the en route domain.

Airport Surveillance Radar - Model 11 — (Surveillance Data) → Automated Radar Terminal System - Model IIE

The ASR-11 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 11 — (Weather Data) → Automated Radar Terminal System - Model IIE

The ASR terminal radar provides detected weather data to the ARTS for processing.

Airport Surveillance Radar - Model 11 — (Surveillance Data) → Automated Radar Terminal System - Model IIIE

The ASR-11 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 11 — (Weather Data) → Automated Radar Terminal System - Model IIIE

The ASR primary radar provides detected weather data to the ARTS for processing.

Airport Surveillance Radar - Model 11 — (Surveillance Data) → En Route Communications Gateway

The ASR-11 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the automation equipment interface, which then routes the data to the HCS and DARC for processing and use in controlling air traffic in the en route domain.

Airport Surveillance Radar - Model 11 — (Surveillance Data) → Microprocessor-En Route Automated Radar Tracking System

The ASR-11 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the automation equipment interface, which then routes the data to the Micro EARTS for processing and use in controlling air traffic in the en route domain.

Airport Surveillance Radar - Model 11 — (Surveillance Data) → Standard Terminal Automation Replacement System

The ASR-11 ground radar provides aircraft positional data (azimuth and slant range) to STARS for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 11 — (Weather Data) → Standard Terminal Automation Replacement System

The ASR-11 provides weather radar data to the STARS application interface gateway for display on its TCW and TDW displays. The radar and local controller uses these data to indicate the precipitation levels present within the TRACON and airport.

Airport Surveillance Radar - Model 7 — (Surveillance Data) → Automated Radar Terminal System - Model IIE

The ASR-7 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 7 — (Weather Data) → Automated Radar Terminal System - Model IIE

The ASR-7 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 7 — (Surveillance Data) → Automated Radar Terminal System - Model IIIE

The ASR-7 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 7 — (Weather Data) → Automated Radar Terminal System - Model IIIE

The ASR-7 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 7 — (Surveillance Data) → Microprocessor-En Route Automated Radar Tracking System

The ASR-7 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the Micro-EARTS for processing and use in controlling air traffic in the terminal domain from a CERAP.

Airport Surveillance Radar - Model 8 — (Surveillance Data) → Automated Radar Terminal System - Model IIE

The ASR-8 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 8 — (Weather Data) → Automated Radar Terminal System - Model IIE

The ASR-8 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIE use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 8 — (Surveillance Data) → Automated Radar Terminal System - Model IIIA

The ASR-8 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIA for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 8 — (Weather Data) → Automated Radar Terminal System - Model IIIA

The ASR-8 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIIA for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 8 — (Surveillance Data) → Automated Radar Terminal System - Model IIIE

The ASR-8 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 8 — (Weather Data) → Automated Radar Terminal System - Model IIIE

The ASR-8 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 8 — (Surveillance Data) → En Route Communications Gateway

The ASR-8 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ECG for processing and use in controlling air traffic in the terminal domain from an ARTCC (for terminals with no TRACON).

Airport Surveillance Radar - Model 8 — (Surveillance Data) → Microprocessor-En Route Automated Radar Tracking System

The ASR-8 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the Micro-EARTS for processing and use in controlling air traffic in the terminal domain from a CERAP.

Airport Surveillance Radar - Model 8 — (Surveillance Data) → Peripheral Adapter Module Replacement Item

The ASR-8 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the PAMRI for processing and use in controlling air traffic in the terminal domain from an ARTCC (for terminals with no TRACON).

Airport Surveillance Radar - Model 9 — (Surveillance Data) → Automated Radar Terminal System - Model IIE

The ASR-9 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 9 — (Weather Data) → Automated Radar Terminal System - Model IIE

The ASR terminal radar provides detected weather data to the ARTS for processing.

Airport Surveillance Radar - Model 9 — (Surveillance Data) → Automated Radar Terminal System - Model IIIA
The ASR-9 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIA for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 9 — (Weather Data) → Automated Radar Terminal System - Model IIIA
The ASR terminal radar provides detected weather data to the ARTS for processing.
Airport Surveillance Radar - Model 9 — (Surveillance Data) → Automated Radar Terminal System - Model IIIE
The ASR-9 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 9 — (Weather Data) → Automated Radar Terminal System - Model IIIE
The ASR primary radar provides detected weather data to the ARTS for processing.
Airport Surveillance Radar - Model 9 — (Surveillance Data) → Standard Terminal Automation Replacement System
The ASR-9 ground radar provides aircraft positional data (azimuth and slant range) to STARS for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 9 — (Weather Data) → Standard Terminal Automation Replacement System
The ASR-9 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the STARS for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) — (Surveillance Data) → Standard Terminal Automation Replacement System
The ASR-9 ground radar provides aircraft positional (azimuth and slant range) as well as time tag, identification, and intent data in ASTERIX format to STARS for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar, Military — (Surveillance Data) → Automated Radar Terminal System - Model IIE
The GPN-20 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar, Military — (Weather Data) → Automated Radar Terminal System - Model IIE
The GPN-20 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIE use in controlling air traffic in the terminal domain.
Airport Surveillance Radar, Military — (Surveillance Data) → Automated Radar Terminal System - Model IIIA
The GPN-20 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIA for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar, Military — (Weather Data) → Automated Radar Terminal System - Model IIIA
The GPN-20 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIIA use in controlling air traffic in the terminal domain.
Airport Surveillance Radar, Military — (Surveillance Data) → Automated Radar Terminal System - Model IIIE
The GPN-20 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar, Military — (Weather Data) → Automated Radar Terminal System - Model IIIE
The GPN-20 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIIE use in controlling air traffic in the terminal domain.
Airport Surveillance Radar, Military — (Surveillance Data) → En Route Communications Gateway
The GPN-20 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ECG for processing and use in controlling air traffic in the terminal domain from an ARTCC (for terminals with no TRACON).
Airport Surveillance Radar, Military — (Surveillance Data) → Peripheral Adapter Module Replacement Item
The GPN-20 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the PAMRI for processing and use in controlling air traffic in the terminal domain from an ARTCC (for terminals with no TRACON).
Automated Radar Terminal System - Model IIE — (Flight Data) → Automated Radar Terminal System Color Display
The ACD displays ARTS flight data to the controller.
Automated Radar Terminal System - Model IIE — (Track Data) → Automated Radar Terminal System Color Display
The ARTS sends track data to the ACD for controller use.
Automated Radar Terminal System - Model IIE ← (Track Data) → En Route Communications Gateway
The ARTS IIE provides terminal surveillance data to the ARTCC's via ECG.
Automated Radar Terminal System - Model IIE ← (Track Data) → Peripheral Adapter Module Replacement Item
The ARTS IIE provides terminal surveillance data to ARTCC's via PAMRI.
Automated Radar Terminal System - Model IIE — (Track Data) → Radar Automated Display System
The ARTS associates surveillance data from the ASR with flight data and provides track data to the controller workstation RADS for display.
Automated Radar Terminal System - Model IIIA — (Flight Data) → Automated Radar Terminal System Color Display
The ACD displays ARTS flight data to the controller.
Automated Radar Terminal System - Model IIIA — (Track Data) → Automated Radar Terminal System Color Display
The ARTS sends track data to the ACD for controller use.
Automated Radar Terminal System - Model IIIA ← (Track Data) → En Route Communications Gateway
The ARTS IIIA provides surveillance data to ARTCC's via ECG
Automated Radar Terminal System - Model IIIA — (Track Data) → Full Digital Automated Radar Terminal System Display
Track data are exchanged between ARTS IIIA and the controller using FDAD.
Automated Radar Terminal System - Model IIIA — (Flight Data) → Host Computer System
The ARTS IIIA provides flight data to HCS via PAMRI.
Automated Radar Terminal System - Model IIIA — (Track Data) → Host Computer System
The ARTS IIIA provides surveillance data to HCS via PAMRI.
Automated Radar Terminal System - Model IIIA ← (Track Data) → Peripheral Adapter Module Replacement Item
The ARTS IIIA provides surveillance data to ARTCC's via PAMRI.
Automated Radar Terminal System - Model IIIE — (Flight Data) → Automated Radar Terminal System Color Display
The ACD displays ARTS flight data to the controller.
Automated Radar Terminal System - Model IIIE — (Track Data) → Automated Radar Terminal System Color Display
The ARTS sends track data to the ACD for controller use.
Automated Radar Terminal System - Model IIIE ← (Track Data) → En Route Communications Gateway
The ARTS IIIE provides surveillance data to ARTCC's via ECG.

Automated Radar Terminal System - Model IIIE — (Track Data) → Full Digital Automated Radar Terminal System Display
Track data are exchanged between ARTS IIIE and the controller using FDAD.
Automated Radar Terminal System - Model IIIE — (Flight Data) → Host Computer System
The ARTS IIIE provides flight data to HCS via PAMRI.
Automated Radar Terminal System - Model IIIE — (Track Data) → Host Computer System
The ARTS IIIE provides surveillance data to HCS via PAMRI.
Automated Radar Terminal System - Model IIIE ← (Track Data) → Peripheral Adapter Module Replacement Item
The ARTS IIIE provides surveillance data to ARTCC's via PAMRI.
Emergency Locator Transmitter — (Position Data) → Very High Frequency Ground Radios
The Emergency Locator Transmitter sends out emergency locator signals that are relayed via the ground radios to the ARTCC for search and rescue effort.
En Route Communications Gateway ← (Flight Data) → En Route Communications Gateway
The ECG provides an interfacility interface to adjacent ARTCCs.
En Route Communications Gateway ← (Track Data) → En Route Communications Gateway
The ECG provides an interfacility interface to adjacent ARTCCs.
En Route Communications Gateway ← (Flight Data) → Host Computer System
The ECG is a conduit through which the HCS receives and exchanges flight data with remote FDIO flight strip printer system (printer/display/keyboard) as well as with external automation systems such as ARTS/STARS (TRACON), ODAPS/FDP2000 (Ocean), and FSM (ATCSCC). FDIO uses the General Purpose Input/Output (GPI/O) parallel interfaces and automation systems use the Interfacility Communications Input/Output (INTI/O) serial interfaces.
En Route Communications Gateway — (Surveillance Data) → Host Computer System
The ECG passes surveillance data from the primary/secondary radars to the HCS for processing and use in controlling aircraft.
Enhanced Terminal Voice Switch — (Voice Communication) → Digital Voice Recorder System
This interface records and temporarily archives voice transmissions.
Enhanced Terminal Voice Switch ← (Voice Communication) → Enhanced Terminal Voice Switch
This interface enables ATC voice communication between controllers in same or different facilities.
Enhanced Terminal Voice Switch ← (Voice Communication) → Integrated Communications Switching System Type I
This interface enables ATC voice communication between controllers in different facilities.
Enhanced Terminal Voice Switch ← (Voice Communication) → Integrated Communications Switching System Type II
This interface enables ATC voice communication between controllers in different facilities.
Enhanced Terminal Voice Switch ← (Voice Communication) → Integrated Communications Switching System Type III
This interface enables ATC voice communication between controllers in different facilities.
Enhanced Terminal Voice Switch ← (Voice Communication) → Rapid Deployment Voice Switch Type I
This interface enables ATC voice communication between controllers in different facilities.
Enhanced Terminal Voice Switch ← (Voice Communication) → Rapid Deployment Voice Switch Type II
This interface enables ATC voice communication between controllers in different facilities.
Enhanced Terminal Voice Switch ← (Voice Communication) → Rapid Deployment Voice Switch Type IIA
This interface enables ATC voice communication between controllers in different facilities.
Enhanced Terminal Voice Switch ← (Voice Communication) → Small Tower Voice Switch
This interface enables ATC voice communication between controllers in different facilities.
Enhanced Terminal Voice Switch ← (Voice Communication) → Ultra High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Enhanced Terminal Voice Switch ← (Voice Communication) → Ultra High Frequency Ground Radios - Replacement
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Enhanced Terminal Voice Switch ← (Voice Communication) → Very High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Enhanced Terminal Voice Switch ← (Voice Communication) → Voice Switching and Control System
This interface enables ATC voice communication between controllers in different facilities.
Host Computer System ← (Flight Data) → Display System Replacement
The HCS sends flight data, time data, traffic management advisories to the DSR display and sends flight plans to the Flight Strip Printer. HCS receives flight plan amendments from ATC via entries on the R-position DSR.
Host Computer System ← (Track Data) → Display System Replacement
The HCS sends target fixes and track data to DSR and receives re-assignment of surveillance to sectors from ATCs as needed. (Note: the type of data passed to DSR is not raw surveillance data but rather is Target (fixes) and track (series of fixes) data produced by the HCS RDP.
Host Computer System — (Weather Data) → Display System Replacement
The HCS sends alphanumeric weather data to the DSR. Note: This is different from weather graphics, which is displayed on the DSR D-position from WARP.
Integrated Communications Switching System Type I — (Voice Communication) → Digital Voice Recorder System
This interface records and temporarily archives voice transmissions.
Integrated Communications Switching System Type I ← (Voice Communication) → Integrated Communications Switching System Type I
This interface enables ATC voice communication between controllers in same or different facilities.
Integrated Communications Switching System Type I ← (Voice Communication) → Integrated Communications Switching System Type II
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type I ← (Voice Communication) → Integrated Communications Switching System Type III
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type I ← (Voice Communication) → Rapid Deployment Voice Switch Type I
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type I ← (Voice Communication) → Rapid Deployment Voice Switch Type II
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type I ← (Voice Communication) → Rapid Deployment Voice Switch Type IIA

This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type I ← (Voice Communication) → Small Tower Voice Switch
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type I ← (Voice Communication) → Ultra High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Integrated Communications Switching System Type I ← (Voice Communication) → Ultra High Frequency Ground Radios - Replacement
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Integrated Communications Switching System Type I ← (Voice Communication) → Very High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Integrated Communications Switching System Type I ← (Voice Communication) → Voice Switching and Control System
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type II — (Voice Communication) → Digital Voice Recorder System
This interface records and temporarily archives voice transmissions.
Integrated Communications Switching System Type II ← (Voice Communication) → Integrated Communications Switching System Type II
This interface enables ATC voice communication between controllers in same or different facilities.
Integrated Communications Switching System Type II ← (Voice Communication) → Integrated Communications Switching System Type III
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type II ← (Voice Communication) → Rapid Deployment Voice Switch Type I
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type II ← (Voice Communication) → Rapid Deployment Voice Switch Type II
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type II ← (Voice Communication) → Rapid Deployment Voice Switch Type IIA
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type II ← (Voice Communication) → Small Tower Voice Switch
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type II ← (Voice Communication) → Ultra High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Integrated Communications Switching System Type II ← (Voice Communication) → Ultra High Frequency Ground Radios - Replacement
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Integrated Communications Switching System Type II ← (Voice Communication) → Very High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Integrated Communications Switching System Type II ← (Voice Communication) → Voice Switching and Control System
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type III — (Voice Communication) → Digital Voice Recorder System
This interface records and temporarily archives voice transmissions.
Integrated Communications Switching System Type III ← (Voice Communication) → Integrated Communications Switching System Type III
This interface enables ATC voice communication between controllers in same or different facilities.
Integrated Communications Switching System Type III ← (Voice Communication) → Rapid Deployment Voice Switch Type I
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type III ← (Voice Communication) → Rapid Deployment Voice Switch Type II
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type III ← (Voice Communication) → Rapid Deployment Voice Switch Type IIA
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type III ← (Voice Communication) → Small Tower Voice Switch
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type III ← (Voice Communication) → Ultra High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Integrated Communications Switching System Type III ← (Voice Communication) → Ultra High Frequency Ground Radios - Replacement
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Integrated Communications Switching System Type III ← (Voice Communication) → Very High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Integrated Communications Switching System Type III ← (Voice Communication) → Voice Switching and Control System
This interface enables ATC voice communication between controllers in different facilities.
Operational and Supportability Implementation System ← (Flight Data) → En Route Communications Gateway
The OASIS and ERAM Increment 3 - En Route Air Traffic Control Decision Support Suite will exchange flight data information via ECG.
Operational and Supportability Implementation System ← (NAS Status Data) → Operational and Supportability Implementation System - Work Station
In addition to providing weather, flight plan data, and NAS status information to the specialist for briefing preparation, OASIS allows the En route Flight Advisory Position to transmit NAS status data, as well as search and rescue data using the OASIS workstation to the Radar Controller and the Rescue Coordination Center.
Operational and Supportability Implementation System ← (Flight Data) → Peripheral Adapter Module Replacement Item
The OASIS currently exchanges flight plans and SAR requests with HCS via PAMRI.
Peripheral Adapter Module Replacement Item — (Flight Data) → Host Computer System
The PAMRI is a conduit through which the HCS receives and exchanges flight data with remote FDIO flight strip printer system (printer/display/keyboard) as well as with external automation systems such as ARTS/STARS (TRACON), ODAPS/FDP2000 (Ocean), and FSM (ATCSCC). FDIO uses the General Purpose Input/Output (GPI/O) parallel interfaces

and automation systems use the Interfacility Communications Input/Output (INTI/O) serial interfaces.

Peripheral Adapter Module Replacement Item — (Surveillance Data) → Host Computer System

The PAMRI passes surveillance data from the primary/secondary radars to the HCS for processing and use in controlling aircraft.

Peripheral Adapter Module Replacement Item — (Flight Data) → Peripheral Adapter Module Replacement Item

The PAMRI passes flight data between ARTCCs.

Peripheral Adapter Module Replacement Item — (Track Data) → Peripheral Adapter Module Replacement Item

The PAMRI passes track data between ARTCCs.

Radio Control Equipment ← (Voice Communication) → Enhanced Terminal Voice Switch

Radio Control Equipment ← (Voice Communication) → Integrated Communications Switching System Type I

Radio Control Equipment ← (Voice Communication) → Integrated Communications Switching System Type II

Radio Control Equipment ← (Voice Communication) → Integrated Communications Switching System Type III

Radio Control Equipment ← (Data Communication) → Radio Control Equipment

Radio Control Equipment ← (Voice Communication) → Rapid Deployment Voice Switch Type I

Radio Control Equipment ← (Voice Communication) → Rapid Deployment Voice Switch Type II

Radio Control Equipment ← (Voice Communication) → Rapid Deployment Voice Switch Type IIA

Radio Control Equipment ← (Voice Communication) → Small Tower Voice Switch

Radio Control Equipment ← (Voice Communication) → Voice Switching and Control System

Rapid Deployment Voice Switch Type I — (Voice Communication) → Digital Voice Recorder System

This interface records and temporarily archives voice transmissions.

Rapid Deployment Voice Switch Type I ← (Voice Communication) → Rapid Deployment Voice Switch Type I

This interface enables ATC voice communication between controllers in same or different facilities.

Rapid Deployment Voice Switch Type I ← (Voice Communication) → Rapid Deployment Voice Switch Type II

This interface enables ATC voice communication between controllers in different facilities.

Rapid Deployment Voice Switch Type I ← (Voice Communication) → Rapid Deployment Voice Switch Type IIA

This interface enables ATC voice communication between controllers in different facilities.

Rapid Deployment Voice Switch Type I ← (Voice Communication) → Small Tower Voice Switch

This interface enables ATC voice communication between controllers in different facilities.

Rapid Deployment Voice Switch Type I ← (Voice Communication) → Ultra High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Rapid Deployment Voice Switch Type I ← (Voice Communication) → Ultra High Frequency Ground Radios - Replacement

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Rapid Deployment Voice Switch Type I ← (Voice Communication) → Very High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Rapid Deployment Voice Switch Type I ← (Voice Communication) → Voice Switching and Control System

This interface enables ATC voice communication between controllers in different facilities.

Rapid Deployment Voice Switch Type II — (Voice Communication) → Digital Voice Recorder System

This interface records and temporarily archives voice transmissions.

Rapid Deployment Voice Switch Type II ← (Voice Communication) → Rapid Deployment Voice Switch Type II

This interface enables ATC voice communication between controllers in same or different facilities.

Rapid Deployment Voice Switch Type II ← (Voice Communication) → Rapid Deployment Voice Switch Type IIA

This interface enables ATC voice communication between controllers in different facilities.

Rapid Deployment Voice Switch Type II ← (Voice Communication) → Small Tower Voice Switch

This interface enables ATC voice communication between controllers in different facilities.

Rapid Deployment Voice Switch Type II ← (Voice Communication) → Ultra High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Rapid Deployment Voice Switch Type II ← (Voice Communication) → Ultra High Frequency Ground Radios - Replacement

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Rapid Deployment Voice Switch Type II ← (Voice Communication) → Very High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Rapid Deployment Voice Switch Type II ← (Voice Communication) → Voice Switching and Control System

This interface enables ATC voice communication between controllers in different facilities.

Rapid Deployment Voice Switch Type IIA — (Voice Communication) → Digital Voice Recorder System

This interface records and temporarily archives voice transmissions.

Rapid Deployment Voice Switch Type IIA ← (Voice Communication) → Rapid Deployment Voice Switch Type IIA

This interface enables ATC voice communication between controllers in same or different facilities.

Rapid Deployment Voice Switch Type IIA ← (Voice Communication) → Small Tower Voice Switch

This interface enables ATC voice communication between controllers in different facilities.

Rapid Deployment Voice Switch Type IIA ← (Voice Communication) → Ultra High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Rapid Deployment Voice Switch Type IIA ← (Voice Communication) → Ultra High Frequency Ground Radios - Replacement

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Rapid Deployment Voice Switch Type IIA ← (Voice Communication) → Very High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Rapid Deployment Voice Switch Type IIA ← (Voice Communication) → Voice Switching and Control System

This interface enables ATC voice communication between controllers in different facilities.

Small Tower Voice Switch — (Voice Communication) → Digital Voice Recorder System

This interface records and temporarily archives voice transmissions.

Small Tower Voice Switch ← (Voice Communication) → Small Tower Voice Switch

This interface enables ATC voice communication between controllers in same or different facilities.

Small Tower Voice Switch ← (Voice Communication) → Ultra High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Small Tower Voice Switch ← (Voice Communication) → Ultra High Frequency Ground Radios - Replacement

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Small Tower Voice Switch ← (Voice Communication) → Very High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Small Tower Voice Switch ← (Voice Communication) → Voice Switching and Control System

This interface enables ATC voice communication between controllers in different facilities.

Standard Terminal Automation Replacement System — (Track Data) → En Route Communications Gateway

Flight data, track data, test data, and responses are exchanged between terminal and en route and between terminal and adjacent terminal.

Standard Terminal Automation Replacement System — (Flight Data) → Host Computer System

The STARS provides flight data to ARTCCs via HCS.

Standard Terminal Automation Replacement System — (Track Data) → Host Computer System

The STARS provides flight data to ARTCCs via HCS.

Standard Terminal Automation Replacement System — (Track Data) → Peripheral Adapter Module Replacement Item

Flight data, track data, test data, and responses are exchanged between terminal and en route and between terminal and adjacent terminal.

Standard Terminal Automation Replacement System — (Track Data) → Standard Terminal Automation Replacement System Terminal Controller Workstation

The STARS provides aircraft positions and flight information to the STARS TCW for controller use.

Standard Terminal Automation Replacement System — (Weather Data) → Standard Terminal Automation Replacement System Terminal Controller Workstation

The STARS provides weather data information to the STARS TCW for controller use.

Ultra High Frequency Ground Radios ← (Voice Communication) → Ultra High Frequency Airborne Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Ultra High Frequency Ground Radios - Replacement ← (Voice Communication) → Ultra High Frequency Airborne Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Very High Frequency Ground Radios ← (Voice Communication) → Very High Frequency Airborne Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Very High Frequency Ground Radios ← (Voice Communication) → Very High Frequency Multi-Mode Airborne Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Voice Switching and Control System — (Voice Communication) → Digital Voice Recorder System

This interface records and temporarily archives voice transmissions.

Voice Switching and Control System ← (Voice Communication) → Ultra High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Voice Switching and Control System ← (Voice Communication) → Ultra High Frequency Ground Radios - Replacement

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Voice Switching and Control System ← (Voice Communication) → Very High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Voice Switching and Control System ← (Voice Communication) → Voice Switching and Control System

This interface enables ATC voice communication between controllers in same or different facilities.

Issues

None

Service Group Air Traffic Services

Service Emergency and Alerting

Capability Alerting Support

Operational Improvement

Enhance Emergency Alerting Support (106202)

Controllers and search and rescue support, using Global Positioning System location information and discrete aircraft identification, locate distressed or downed aircraft, through automatic dependent surveillance system-broadcast. Controllers improve their ability to assist in locating a downed aircraft and to identify and track visual flight rules flights.

30-Jun-2015 to 30-Jun-2024

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

The National Search and Rescue (SAR) Plan assigns search and rescue responsibilities to military agencies for conducting physical search and rescue operations. Under the plan, the U.S. Coast Guard is responsible for the coordination of SAR in the Maritime Region, and the USAF is responsible in the Inland Region. To carry out these responsibilities, the Coast Guard and the Air Force have established Rescue Coordination Centers (RCCs) to direct SAR activities within their regions.

The FAA provides emergency service to aircraft in distress, and assures that SAR procedures are initiated if an aircraft becomes overdue, unreported, or upon detection of an emergency locator signal. Precise information is available from Global Positioning System (GPS) and Automatic Dependent Surveillance - Broadcast (ADS-B) equipped aircraft, both of which automatically provide position via digital data links. This is accomplished through the Air Route traffic Control Centers (ARTCCs) for IFR aircraft, and through the Automated Flight Service Stations (AFSSs) for VFR aircraft. The FAA also is responsible for attempting to locate overdue or unreported aircraft by INREQ (Information Request) and ALNOT (Alert Notice) communications searches, and cooperating in the physical search by making all possible facilities available for use of the searching agencies.

When an aircraft is overdue or missing, a communications search is initiated to determine if or when the aircraft last contacted an ATC facility. The essential information is gathered for the aircraft (flight plan data, last known position, last recorded heading, search area conditions which includes current and forecasted weather etc.) and distributed to the Rescue Coordination Center (RCC) for the rescue coordinator prior to initiating the SAR effort. If ATC facilities hear or receive an ELT (Emergency Locater Transmitter) signal, the distressed aircraft location can be accurately determined by the GPS position data. This information is forwarded to the RCC to support the SAR activities.

The Air Route Traffic Control Center (ARTCC) also considers an aircraft to be in emergency status and requiring Search and

Rescue (SAR) procedures when it is receiving an emergency locator signal from a distressed aircraft. The facility forwards pertinent information such as the GPS position of the aircraft, flight plan information, time of last transmission received (by whom and frequency), last position report, number of persons on board, fuel status, facility working the aircraft and frequency, action taken by reporting facility and proposed action, last known position, estimated present position, and maximum range of flight of the aircraft based on remaining fuel and airspeed, and additional information such as, current area weather, the position of other aircraft near the aircraft's route of flight, whether or not an ELT signal has been heard or reported in the vicinity of the last known position and other pertinent information that may help locate the aircraft. The ARTCC would then alert the RCC and forward all the available information.

The ARTCC also issues an alert notice (ALNOT) to all facilities generally 50 miles on either side of the route of flight, from the last reported position to destination, including the original or amended flight plan, as appropriate, and the last known position of the aircraft. At the recommendation of the RCC or as deemed appropriate, the ALNOT may be issued to cover the maximum range of the aircraft. NOTE- An ALNOT must be issued before the RCC can begin search and rescue procedures.

When an ATC facility receives an Information Request (INREQ) or ALNOT, it checks the position records to determine whether the aircraft has contacted the facility. It notifies the originator of the results or status of this check within one hour of the time the alert was received. It retains the alert in an active status, and immediately notifies the originator of subsequent contact, until a cancellation is received. The ARTCC plots the flight path of the aircraft on a chart, including position reports, predicted positions, possible range of flight, and any other pertinent information, derived from DSR and en-route Host Computer System (HCS). They solicit the assistance of other aircraft known to be operating near the aircraft in distress or it's last known position, and forward this information to the RCC as appropriate.

The ARTCC would transfer responsibility for further search to the RCC when thirty minutes have elapsed after the estimated aircraft fuel exhaustion time, the aircraft has not been located within one hour after ALNOT issuance, or when the ALNOT search has been completed with negative results. The ARTCC cancels the ALNOT when the aircraft is located or the search is abandoned.

Benefits

With the use of GPS, a Controller's ability to assist in locating a downed airplane is improved.

Systems

Air Route Surveillance Radar - Model 1E

The Air Route Surveillance Radar - Model 1E (ARSR-1E) is a 1970s analog radar. It is a long-range radar system with a maximum detection range of 200 nm. The ARSR-1E is a surveillance system used to detect azimuth and slant range of en route aircraft operating between terminal areas. It also provides weather intensity data.

Air Route Surveillance Radar - Model 2

The Air Route Surveillance Radar - Model 2 (ARSR-2) is a 1970s analog radar. It is a long-range radar system with a maximum detection range of 200 nm. The ARSR-2 is a surveillance system used to detect azimuth and slant range of en route aircraft operating between terminal areas. It also provides weather intensity data.

Air Route Surveillance Radar - Model 3

The Air Route Surveillance Radar - Model 3 (ARSR-3) is a 1980s radar that provides primary long range surveillance data, including slant range and azimuth data. It processes the returns which includes demodulation, analog-to-digital conversion, moving target indicator function, sensitivity time control, range and azimuth gating, and digital target extraction - all of which are performed digitally (with the exception of the demodulation and analog-to-digital conversion). In addition, the ARSR-3 has a weather channel with associated processing to provide weather contour information in digital format.

Air Route Surveillance Radar - Model 4

The Air Route Surveillance Radar - Model 4 (ARSR-4) is a three-dimensional, long-range, rotating phased array, primary surveillance radar with integrated height finder capability. It is part of the joint surveillance system (JSS) used in conjunction with ARSR-3 coverage as part of the nationwide air defense command surveillance network. In addition to functions peculiar to the military, the ARSR-4 performs the same basic functions of the ARSR-3, by providing primary long-range surveillance data, including slant range and azimuth data.

Air Traffic Control Beacon Interrogator - Model 6

The Air Traffic Control Beacon Interrogator Model 6 (ATCBI-6) is a ground-based system that interrogates transponders, receives and processes replies from transponders, determines the range and azimuth to the aircraft, and forwards the information to appropriate air traffic control (ATC) automation systems. Replies provide identification and altitude data of the transponder.

Airport Surveillance Radar - Model 11

The Airport Surveillance Radar- Model 11 (ASR-11) is a digital, combined primary and secondary surveillance radar (SSR), short-range radar system with a 60 nautical mile (nmi) detection range for medium and small activity airports. The ASR-11 provides advanced digital primary radar including weather intensity surveillance with an integrated monopulse SSR system for use in the airport terminal area. The ASR-11 is used to detect and report the presence and location of an aircraft in a specific volume of airspace. The ASR-11 provides search radar surveillance coverage in controlled airspace primarily in terminal areas.

Airport Surveillance Radar - Model 7

The Airport Surveillance Radar - Model 7 (ASR-7) is a short-range (60 nm) analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the Air Traffic Control Beacon Interrogator - Model 4 or Model 5 (ATCBI-4 or ATCBI-5) or Mode S. This system will be replaced by the ASR-11.

Airport Surveillance Radar - Model 8

The Airport Surveillance Radar - Model 8 (ASR-8) is a short-range (60 nm), analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the Air Traffic Control Beacon Interrogator - Model 4 or Model 5 (ATCBI-4 or ATCBI-5) or Mode S.

Airport Surveillance Radar - Model 9

The Airport Surveillance Radar - Model 9 (ASR-9) is a short range (60 nm) radar system for the airport terminal area. The ASR-9 processes the returns from aircraft targets, which includes demodulation, analog-to-digital conversion, range and azimuth gating, sensitivity timing control, and a moving target detection function. The moving target detector includes two-level weather contour processing, digital signal processing, correlation and interpolation processing, and surveillance processing. The ASR-9 has a separate weather channel with associated processing capable of providing six-level weather contours. The two-level weather contour processing associated with the moving target detector is only be used for backup. The six-level weather channel is primarily used to supplement Next Generation Weather Radar (NEXRAD) coverage. It is normally used in conjunction with Mode Select (Mode S) but it can accommodate an Air Traffic Control Beacon Interrogator Model 4/5 (ATCBI-4/5).

The ASR-9 will be upgraded/replaced with the ASR-9/Mode S SLEP (see separate mechanism) in the 2007-12 time frame.

Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program)

The Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) (ASR-9/Mode S (SLEP)) mechanism provide the necessary technical refresh to extend the service life of the ASR-9 and Mode S through 2030. The ASTERIX upgrade has not been implemented, but will be implemented at a later date.

Automated Radar Terminal System - Model IIE

The Automated Radar Terminal System - Model IIE (ARTS IIE) provides radar data processing (RDP) and decision support tools to the controller in the terminal environment. Utilized at low to medium-size Terminal Radar Control (TRACONs) Facilities the ARTS IIE is capable of receiving input from up to 2 sensors, can process up to 256 tracks simultaneously, and support up to 22 displays. The ARTS IIE implements the Common ARTS software for improved performance maintenance efficiency. The radar data processing (RDP) software provides automated surveillance tracking and display processing. Included in the ARTS IIE software are decision support tools such as Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Mode C intruder alert, Converging Runway Display Aid (CRDA), and Controller Automation Spacing Aid (CASA).

Automated Radar Terminal System - Model IIIE

The Automated Radar Terminal System - Model IIIE (ARTS IIIE) consists of the hardware platform and software required providing radar data processing (RDP) and decision support tools to the controller in the terminal environment. The ARTS IIIE is used at consolidated Terminal Radar Approach Control (TRACON) facilities. The Common ARTS program provided an ARTS IIIE capable of receiving input from up to 15 sensors, the ability to process up to 10,000 tracks simultaneously, and support up to 223 displays. The RDP software provides automated surveillance tracking and display processing including mosaic display of radar data. Included in the ARTS IIIE software are decision support tools such as Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Mode C intruder alert, Converging Runway Display Aid (CRDA), Final Monitor Aid (FMA), and controller automation spacing aid.

Automated Radar Terminal System Software

Provides maintenace of the Automated Radar Terminal System Software (ARTS S/W) for ARTS IIE, ARTS IIIA and ARTS IIIE. Functions include radar data processing (RDP), Minimum Safe Altitude Warning (MSAW); controller automated spacing tool, Converging Runway Display Aid (CRDA), Final Approach Monitor (FMS), and other tools to assist the terminal and tower controllers to manage the air traffic in the terminal area.

Automated Radar Terminal System Software Modification (All Purpose Structured Eurocontrol Information Exchange, etc,)

Automated Radar Terminal System Software Modification (All Purpose Structured Eurocontrol Information Exchange (ASTERIX), etc,), (ARTS S/W Mod (ASTERIX, etc)). Modification to the ARTS software that will add capabilities including weather product integration on the displays, processing of ASTERIX formatted surveillance data, improved traffic management and surveillance data processing, Ground-Initiated Communications Broadcast (GICB), and terminal data link functionality.

Automatic Dependent Surveillance (Capstone) Ground Station

The Automatic Dependent Surveillance (Capstone) Ground Station (ADS (Cap) Ground Station) is a demonstration system used by the Capstone project under Safe Flight 21. It receives Global Positioning System (GPS)-derived aircraft four (4)-dimensional position data, aircraft identification, aircraft velocity, and other selected aircraft data for processing at ATC facilities, and transmits Traffic Information System - Broadcast (TIS-B) information on aircraft in areas of radar coverage (and other airspace status information when available) to properly to equipped aircraft, to support operational trials. These ground stations are located in remote locations in Alaska, and feed the Anchorage Air Route Traffic Control Center (ARTCC) automation system.

Automatic Dependent Surveillance - Broadcast Avionics (key system)

Automatic Dependent Surveillance-Broadcast Avionics (ADS-B Avionics) transmits and receives Global Positioning System (GPS)-derived aircraft 4-dimensional position data, aircraft identification, aircraft velocity, and other selected aircraft data. Augmented GPS data may be required for certain applications. This is intended to be a surveillance system and not an avoidance system. The broadcast of own position is automatic and is intended to provide surveillance information to other users. The aircraft or vehicle originating the broadcast may not have knowledge of which users are receiving its broadcast. The ADS-B avionics are designed to transmit this 4-dimensional position data of own aircraft or vehicle and to also receive same type of information from others that are similarly equipped to receive and process ADS-B surveillance information.

BSGS Broadcast Services Ground Station (key system)

The BSGS (Broadcast Services Ground Station) supports Air-Ground broadcast services. This includes the reception of ADS-B from equipped aircraft/vehicles and the transmission of Traffic Information Service-Broadcast (TIS-B) and Flight Information Service-Broadcast (FIS-B) for use by equipped aircraft. Generally, the BSGS will interface via the SDN to provide ADS-B information to ATC automation and receive TIS-B and FIS-B information from TIS-B and FIS-B servers. The BSGS includes antenna(s), one or more dual link (i.e., 1090 MHz Extended Squitter-1090ES and Universal Access Transceiver-UAT) Ground Based Transceiver(s)(GBT), processing functions and communications functions. Several configurations of the BSGS are required to support variations in the geographic service volume and functions to be supported at specific categories of operational sites. BSGSs will be installed at 448 airports and 100 en route locations. Included are those airports equipped with Secondary Surveillance Radar (SSR) and about 140 additional towered airports (currently without SSR). The BSGS will support ADS-B and TIS-B services via both the 1090ES link and by the UAT link. The BSGS will also support FIS-B via the UAT link. BSGSs incorporate a multilink gateway function that provides ADS-B rebroadcasts via the ADS-B alternate link. A BSGS incorporating 2 GBTs are required for airport surface and terminal surveillance coverage at each of 268 smaller airports, a BSGS incorporating 3 GBTs (on average) are required at 120 of the mid-sized airports, and a BSGS incorporating 6 GBTs (on average) are required at the 60 largest airport (those equipped with ASDE-X or ASDE-3 surface surveillance systems).

The following BSGS functions are required to support the various categories of NAS BSGS sites, except as noted below: (1) 1090ES and UAT receive/transmit (i.e., the GBT funnction); (2) multi-link gateway function; (3) process received ADS-B messages and output (via the SDN) ADS-B reports for use by ATC automation; (4) accept TIS-B and FIS-B information from ground TIS-B/FIS-B servers and manage the generation and broadcast of link specific TIS-B messages via the 1090ES and UAT links and FIS-B messages via the UAT link.

The following BSGS configurations are assumed based on the category of the operational site. Except as noted below all BSGS configuration support the above described functions.

En route (100 sites): (1) One multi-sector antenna with each sector connected to the individual 1090ES and UAT receivers. Supports up to 250 nmi. ADS-B reception. En route locations that are intended to provide only low-altitude gap filler coverage do not require the long-range capability. (2) One omni-directional transmit antenna. Transmitter power sized to support the required TIS-B and FIS-B coverage for that specific site.

Terminal/Airport without ASDE-X (415 airports incl. 27 ASDE-3 equipped airports) with each site having: (1) BSGS with at least 2 GBTs with omni-directional antennas sited for both airport surface and terminal airspace coverage; (2) additional GBTs as needed to provide coverage of the primary airport surface movement area.

Terminal/Airport with ASDE-X (26 ASDE-X plus 7 upgraded ASDE-3 airports with an average of 6 GBTs per BSGS): (1) ASDE-X ground stations upgraded to support GBT functionality; (2) At least two of the GBTs provide ADS-B coverage to the edge of the terminal airspace and the TIS-B coverage; (3) ASDE provides the surveillance data source to support TIS-B for surface traffic.

Digital Airport Surveillance Radar

The Digital Airport Surveillance Radar (DASR) provides advanced digital primary radar including weather intensity surveillance with an integrated mono-pulse Secondary Surveillance Radar (SSR) system for use in the airport terminal area. (Military version of ASR-11)

Digital Voice Recorder System

Provides modern digital voice recording devices used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

In Feburary 2004, the DVRS was upgraded with a 24-channel card, which replaced the 16-channel card. This minor upgrade, called DVR II, was not extended to the systems installed prior to February 2004.

Digital Voice Recorder System Replacement

The Digital Voice Recorder System Replacement (DVRS Replacement) is a modern digital system used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

Display System Replacement

The Display System Replacement (DSR) provides continuous real-time, automated support to air traffic controllers for the display of surveillance, flight data and other critical control information. This information is processed by the Host and Oceanic Computer System Replacement (HOCSR) and the Enhanced Direct Access Radar Channel (EDARC) subsystems. The DSR provides controller workstations, displays, and input/output devices and a communications infrastructure to connect the DSR with external processing elements of the en route ATC automation system.

Display System Replacement - R-position Technical Refresh

Display System Replacement R-position Technical Refresh (DSR R-posit Tech Refresh) replaces the processor and LAN infrastructure for the R-position in preparation for ERAM. The replacement display will provide full and equivalent functionality (flight and surveillance data) on both the primary and backup ERAM channels. The R-position display processor will have direct data exchange capability with each of the ERAM LAN attached processors, including the Surveillance Data Processor (SDP), Flight Data Processor (FDP), Conflict Probe Processor (CPP), Traffic Management Advisor (TMA), and Controller-Pilot Data Link Communications (CPDLC).

Display System Replacement Console Reconfiguration Monitor Replacement

Display System Replacement Console Reconfiguration Monitor Replacement (DSR CRMR) replaces the R-position cathode ray tube (CRT) with a 20 x 20-inch square flat panel liquid crystal displays (LCD). Replacement of the large CTR with a LCD will free up space in the rear of the DSR console for relocating Voice Switch Control System (VSCS) equipment. Relocating the VSCS Electronic Module (VEM) and the VSCS Training and Backup System (VTABS)--formerly known as VEM/PEM)--is part of this activity and will improve equipment efficiency, packaging and the productivity of maintenance personnel.

Emergency Locator Transmitter

An Emergency Locator Transmitter (ELT) is a device that transmits a signal when activated by the crash of the airplane. ELT aids search and rescue (SAR) efforts in locating downed aircraft. This is the minimum function required by the Federal Aviation Regulation (FAR) Part 91.207 as of July 2000. There is a new standard for the ELT, TSO-126, which in 2009 will make the ELT transmit both on 406 Mhz, to communicate with satellite SAR services, and 121.5 MHz homing beacon which is monitored by Civil Air Patrol.

Emergency Locator Transmitter - Global Positioning System

An Emergency Locator Transmitter - Global Positioning System (ELT - GPS) is a device carried on an aircraft that transmits the unique identification of the transmitter and the position of the aircraft (determined by the Global Positioning System) when activated by the crash of the aircraft. Supported but not required in the Code of Federal Regulations (CFR) Part 91.207 as of July 2000.

Emergency Locator Transmitter - Satellite

An Emergency Locator Transmitter - Satellite (ELT - SAT) is a device carried on an aircraft that transmits the unique identification of the transmitter when activated by the crash of the aircraft. Supported but not required in the Code of Federal Regulations (CFR) Part 91.207 as of July 2000.

Emergency Voice Communications System

The Emergency Voice Communications System (EVCS) is located at Headquarters (HQ), Regional Offices, several Air Route Traffic Control Centers (ARTCCs), Terminal Radar Approach Control (TRACON) facilities, and other selected sites. EVCS uses two (2) dedicated Federal Telecommunications Service 2001 (FTS2001) dial access channels at most FAA locations. Dedicated dial lines using the Public Switched Telephone Network (PSTN) are used at locations not having direct access to FTS2001. Supports HQ and Regional Communications Command Centers'' functions for accident and incident reports, hijacks, aircraft crashes, aviation security matters, military activities, natural disasters, etc.

En Route Automation Modernization (key system)

The En Route Automation Modernization System (ERAM System) will replace the existing diverse but functionally unequal primary and backup channels (Host and DARC) with redundant, functionally equivalent primary and backup channels. The new primary and backup channels achieve identical full functionality by using highly reliable fault tolerant processing elements running identical software. A tertiary system with diverse software, and physical and electronic isolation from the ERAM primary and back-up systems, will be maintained as fall back until the functionality, reliability, and availability of ERAM is demonstrated in the field. A training subsystem with functionality identical to the operational system will permit training to be conducted in parallel with operations.

In the past decade, several functions (URET, CTAS, etc.) were implemented as outboard processors/processes to the Host. As ERAM evolves in successive builds, this functionality will be integrated into ERAM as described below.

ERAM''s enhanced FDP will accommodate flexible routing around congestion, weather, and restrictions and improve efficiency by providing improved traffic flows. The enhanced ERAM surveillance processing will accomodate a larger geographic coverage, increased quantity of radar inputs and, when available, integration of Automatic Dependent Surveillance Broadcast data. In addition ERAM will use the improved accuracy and information disseminated by the sensors using the All-purpose Structured EUROCONTROL Radar Information Exchange (ASTERIX) format.

ERAM will allow for improved performance of decision support tools such as the Enhanced Traffic Management System (ETMS). ERAM will also incorporate Center-terminal radar approach control automation system (CTAS) functions (descent advisor, timelines, load graphs, automated miles-in-trail, and the situation display) and multi-center metering using miles-in-trail or time-based scheduling and meter lists.

ERAM will employ an industry standard LAN-based system to improve the efficiency of integrating commercial-off-the-shelf solutions in the future. ERAM software will be developed using a common high-level language to increase the FAA''s access to market-based skills and lower the cost of development and lifecycle maintenance. ERAM''s design will enable future enhancements and maintenance of components without affecting operational availability and increased productivity from an integrated monitor and control capability.

En Route Communications Gateway

The En Route Communications Gateway (ECG) replaces PAMRI and provides a modernized LAN-based infrastructure capable of accommodating ERAM with minimal modifications. The PAMRI functions to be replaces include providing communications interfaces to external systems located in other ARTCCs, TRACONs, AFSSs, ATCSCC, NORAD, US Law Enforcement, US Customs, Military Base Operations, and international ACCs. Other interfaces include the FDIO Central Control Unit, which exchanges FDIO data with FAA and DOD facilities, and the NADIN Concentrator, which exchanges data through the NADIN PSN with the the M1FC via WMSCR. ECG increases the number of external interfaces to radars from 24 to 36. ECG provides internal interfaces between HCS and DARC (or EBUS) and between HCS and traffic flow processors such as ETMS and DSP. ECG includes a Monitor and Control subsystem and a display for monitoring up to two dozen radars--called the Random Access Plan Position Indicator (RAPPI).

The operational components of ECG consist of a front end processor (communications and surveillance interfaces), two gateway processors (internal connectivity to HCS and DARC/EBUS), and separate LANs that communicate between the front end and gateway processors on the primary channel and between the front end and gateway processors on the backup channel. The primary data path, consisting of the ECG primary gateway and the HCS, operate on separate hardware platforms. However, the backup data path, consisting of the ECG backup gateway and the EBUS, will operate on the same hardware platform--the ECG gateway platform. This processor, with both functions performed therein, is renamed to the Backup Interface Processor (BIP). In essence, a single processor operates on the backup channel, supporting both the ECG gateway function and the EBUS function. These two functions will remain, however, as two mechanisms in the NAS architecture.

Enhanced Back-up Surveillance

The Enhanced Back-Up Surveillance (EBUS) system replaces the DARC system in use at the 20 Air Route Traffic Control Centers (ARTCC) in the contiguous United States (CONUS), the William J. Hughes Technical Center (WJHTC), and the FAA Academy (FAAAC). The EBUS design employs the existing FAA-certified software of the Microprocessor En Route Automated Radar Tracking System (Micro-EARTS) application to provide radar data processing (RDP) services for the replacement legacy backup system. Micro-EARTS provides key capabilities not supported by the DARC legacy system it replaces, among which are the safety functions of Conflict Alert (CA), Mode-C Intruder (MCI), and Minimum Safe Altitude Warning (MSAW). EBUS also provides Next Generation Radar (NEXRAD) weather data to R-position users via the DSR Backup Communications Network (BCN). EBUS makes the R-position functionality on the backup channel more comparable to that of the primary channel.

The EBUS software (Micro EARTS) and the ECG backup gateway software will share the same hardware platform such that both software functions will reside in the same ECG backup gateway hardware platform.

Enhanced Terminal Voice Switch

The Enhanced Terminal Voice Switches (ETVS) are installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) facilities with more than four air traffic controller positions. The ETVS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The ETVS (installed in the ATCT) provides the ATC operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the ETVS.

The ETVS (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within a TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the ETVS.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate ETVS systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Fixed Position Surveillance - Model 117

The Fixed Position Surveillance - Model 117 (FPS-117) radar is a joint-use military surveillance system used by the FAA to detect slant range and azimuth of en route aircraft. These radars are located in Alaska (12) and Hawaii (1), and are expected to be sustained until at least 2020.

Fixed Position Surveillance Model 20 Series

The Fixed Position Surveillance Model 20 Series (FPS-20 Series) is a military primary radar of various models (FPS-20A, FPS-64, FPS-66A, FPS-67/A/B, and ARSR-60M) used by the FAA to detect slant range and azimuth of en route aircraft operating between terminals in the continental United States. Each of the different radar models is a similar variation of the original FPS-20 military radar.

Flexible Voice Switch (key system)

Voice communications is the primary means of communications among ATC facilities and between an Air Traffic Control Specialist (ATCS) and a pilot. Voice switching provides the ATCS both G/G Interfacility/Intrafacility and A/G voice communications connectivity. The NAS Voice Switch (NVS) program will replace aging voice switches and their analog interfaces with modern digital voice switches consisting of digital interfaces. The Flexible Voice Switch will be the common platform and baseline voice switch for all NAS domains with modularity and scalability to meet communications connectivity requirements. Additionally, this switch will be expandable to accommodate growth capacity requirements and able to support NAS Modernization needs as described in various Operational Improvements.

Full Digital Automated Radar Terminal System Display

Full Digital ARTS Display (FDAD) is the fully digital ARTS display system that provides the display and data input devices for terminal controllers using ARTS IIIE and ARTS IIIA. The FDAD can work in analog video time share mode or full digital mode. The present application is analog video time share mode.

Global Positioning System (key system)

The Global Positioning System (GPS) is a worldwide, all-weather, satellite-based navigation system developed, maintained & operated by the U.S Department of Defense, and managed by an Interagency executive board. GPS is a (nominal) 24 satellite constellation orbiting at approximately 12,000 miles above the earth in six planes. Each satellite broadcasts a precisely timed L-band signal on the same frequency. User GPS receivers, oboard aircraft, in ground vehicles or hand-held, receive and process the signals from all satellites in view, with a minimum of four satellites necessary to determine the receiver''s three-dimensional position (i.e., latitude, longitude and altitude), velocity (if applicable) and the precise time of day. GPS equipped aircraft can navigate on published jetways or utilize Area Navigation (RNAV) to fly any desired course between two locations.

GPS avionics built to TSO C-129 support en route and terminal area navigation, as well as non-precision instrument approach operations. Approval has been granted for properly certified GPS avionics to be used as a primary means of navigation in oceanic airspace and in certain remote areas. In July 2003 the Wide Area Augmentation System (WAAS)was commissioned to augment the GPS signal to meet primary navigation service requirements for accuracy, coverage, availability, and integrity.

Heating, Ventilation and Air Conditioning - Long-Range Radar

The Heating, Ventilation and Air Conditioning - Long-Range Radar (HVAC - LRR) mechanism provides the systems to maintain the temperature and relative humidity within the facility at acceptable levels for LRR system operation or personnel comfort as required. This includes filtering of air to Occupational Safety and Health Administration (OSHA) requirements.

High Frequency Airborne Radios

High Frequency (HF) Airborne Radios are analog (HF multi-channel radio transceivers operating in the 2 - 30 Mhz frequency band installed in airborne commercial, cargo, and military aircraft transiting the oceanic, en route, terminal, or flight service station airspace domains. These transceivers are typically used in transoceanic applications.

High Frequency Ground Radios

High Frequency (HF) Ground Radios are analog HF radio devices operating in the 2 - 30 Mhz frequency band, which may be single channel transmitters and receivers or multi-channel transceivers. These radio devices are installed at oceanic and en route facilities and used to support tactical air traffic control (ATC) voice communications between a ground controller and a pilot in an aircraft in the oceanic domain. Additionally, these devices are also installed at regional facilities and used to support voice command and control communications /coordination in emergency or during disaster recovery situations occurring in the NAS.

Host Computer System

The Host Computer System (HCS) receives and processes surveillance reports, and flight plan information. The HCS sends search/beacon target, track and flight data, surveillance and alphanumeric weather information, time data, traffic management advisories and lists to the (Display System Replacement) DSR. The HCS associates surveillance-derived tracking information with flight-planning information. The DSR sends requests for flight data, flight data updates, and track control messages to the HCS. HCS-generated display orders are translated for use within the DSR workstation. While radar data processing is distributed among the terminal and En Route computer resources, the HCS performs virtually all of the flight data processing for its entire geographical area of responsibility. Every tower (ATCT) and terminal radar approach control (TRACON) relies exclusively on its parent HCS for flight data.

The HCS also runs algorithms that perform aircraft to aircraft (conflict alert) and aircraft to terrain (Minimum Safe Altitude Warning) separation assurance. The HCS algorithms provide visual and audible alerting to the controller when conflicts are identified.

The HCS presently supplies real time surveillance, flight data and other information to several decision support tools housed in collocated outboard processors connected via two-way high bandwidth links to the HCS and DSR. These are the (User Request Evaluation Tool, (URET), and the Traffic Management Advisory (TMA. URET performs probing of tentative flight plan changes to determine their viability. TMA provides sequencing and spacing information to align the aircraft in En Route airspace for approach.

Host Computer System / Oceanic Computer System Replacement

The Host Computer System & Oceanic Computer System Replacement (HCS/OCSR--HOCSR) was implemented because of potential Y2K hardware issues with previous hardware. Accordingly, HCS/OCSR provided a new hardware platform, new peripherals (printers and Keyboard Display Video Terminals--KVDT), a new Direct Access Storage Device (DASD), and new OS-370 software extensions to control the new hardware using legacy NAS software applications. Hardware was replaced in both the En Route and Anchorage Oceanic automation environments. HCS/OCSR did not modify the legacy software functions of either the HCS system (e.g., flight data processing, radar data processing) or the Ocean Display and Planning System (ODAPS) automation systems (e.g., filght data processing). Likewise, HCS/OCSR did not impact HID NAS LAN, URET, DSR or PAMRI.

Phase 1 and 2 (mainframe and software extension replacements) were completed prior to 2000. Phase 3 (DASD replacement) was completed in 2003. Phase 4 (peripheral replacement) will be completed in 2004. Enhancement planned for 2005 and beyond were cancelled as they are overtaken by ERAM. Each phase has its own waterfall, and consequently no waterfall can be provided in the Location section below.

Integrated Communications Switching System Type III

The Integrated Communications Switching System Type III (ICSS III) is installed at Automated Flight Service Stations (AFSS). The ICSS III (installed in the AFSS) provides the air traffic control (ATC) operational ground-to-ground (G/G)voice communications interconnectivity between specialists within an AFSS (intercom), interconnectivity between specialists in separate AFSSs (interphone), and interconnectivity between Flight Service Station (FSS) specialists and Air Route Traffic Control Center (ARTCC) controllers/Terminal Radar Approach Control (TRACON) controllers/ATCT controllers/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between AFSS specialists and pilots is also supported by the ICSS III.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS II systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Integrated Information Workstation - Build 1

IIW Build 1 will include the infrastructure and system interfaces to acquire, analyze, store, update, display, and manage the following information in an integrated manner: (1) National Airspace System (NAS) aeronautical, (2) airport environmental, (3) airborne and surface surveillance, (4) flight information, (5) weather information, and (6) NAS status. Build 1 will also replace its predecessor system, FAA Data Display System, as well as interface with the following systems in support of its mission: Flight Object Management, System Wide Information Management, Next Generation- Traffic Flow Management, Maintenance Management System, Unified Decision Management System, and Aeronautical Information Management.

Integrated Information Workstation - Build 2

Build 2 will incorporate new hardware technology and software enhancements through a technical refresh program.

Low-Density Radio Communications Link

The Low-Density Radio Communications Link (LDRCL) is an FAA owned Low-Density Radio Communications Link (LDRCL) satisfies short-haul, low-density communication requirements. It provides user access (via tail circuits) to a Radio Communications Link (RCL) site or connectivity between two operational facilities

Microprocessor-En Route Automated Radar Tracking System

The Microprocessor-En Route Automated Radar Tracking System (Micro-EARTS) is a radar processing system implemented with Commercial Off-the-Shelf (COTS) equipment, for use in both En Route and Terminal environments. It provides single sensor and a mosaic display of traffic and weather using long- and short-range radars. At Anchorage, Alaska, Micro-EARTS also provides Automatic Dependent Surveillance-Broadcast (ADS-B) surveillance and display. Micro-EARTS interfaces with multiple types of displays, including Display System Replacement (DSR), Digital Bright Radar Indicator Tower Equipment (DBRITE), and the flat panel tower controller displays.

Mode Select

The Mode Select (Mode S) mechanism is a ground-based system capable of selective interrogation of Mode S transponders and general interrogation of Air Traffic Control Radar Beacon System (ATCRBS) transponders within range. The system also receives, processes, and forwards the transponder replies to appropriate air traffic control (ATC) automation systems. Data formats for both interrogation and reply include data exchange capability.

The system also provides a Traffic Information Services (TIS) function that makes local traffic data available to the flight deck via the Mode S data link. TIS, a Mode S data link service, provides automatic traffic advisories to properly equipped aircraft. Pilots are able to request and receive a display of nearby traffic. The relative range, bearing, and altitude (if known) and a "proximate" or "threat" classification of nearby aircraft will be displayed in the cockpit.

Mode Select Transponder

The Mode Select Transponder (Mode S Transponder) is an avionics system that responds to 1,030 MHz interrogations from ground-based sensors or Traffic Alert and Collision Avoidance System (TCAS) airborne avionics with 1,090 MHz replies containing aircraft identification, altitude, and other selected data. Mode S transponders offer improvements over conventional Air Traffic Control Radar Beacon System (ATCRBS) transponders in that they provide over 16 million unique beacon codes, can be selectively interrogated to prevent overlapping or garbling of replies from proximate aircraft, and can provide a high-capacity air-ground data link. In addition to responding to "all call" or "roll call" interrogations from ground-based sensors or TCAS avionics, the Mode S transponders are required to transmit or squitter their 24-bit unique identity and altitude once per second. These squitters are "voluntary" or automatic and not in response to any interrogation. The squitters allow TCAS avionics in proximate aircraft or other systems to acquire Mode S equipped aircraft by only listening on 1,090 MHz.

Multi-Mode Digital Radios

Multi-Mode Digital Radios (MDRs) are ground-based Very High Frequency (VHF) air-traffic-control radios that can operate in several configurations: 1) analog voice with 25kHz channel spacing; 2) analog voice with 8.33 kHz channel spacing; and 3) VHF Data Link (VDL) Mode-3 which consists of two-way digital voice and data communication.

Operational and Supportability Implementation System

Operational and Supportability Implementation System (OASIS): The capabilities provided by the OASIS include alphanumeric and graphic weather product acquisition and display, flight plan processing, search and rescue services, and law enforcement support. The OASIS provides a real-time, multi-user, computer-based system that provides current weather information, forecast weather information, Notice to Airmen (NOTAM) information, and flight planning.

OASIS also supports flight service specialists at International Automated Flight Service Stations (IAFSS) that provide services associated with aircraft transiting the oceans.

Operational and Supportability Implementation System - Work Station

The Operational and Supportability Implementation System - Work Station (OASIS W/S) is a Windows-based PC located at each specialist position. It includes COTS software applications to provide the AFSS specialist with an integrated view of flight, alphanumeric, and graphic weather data. Pre-Flight and in-flight service functions are also available from these workstations.

Power System - Long-Range Radar

The Power System - Long-Range Radar (Pwr Sys - LRR) mechanism provides conditioning of commercial power, including uninterruptible power systems (UPS), to eliminate voltage dropouts, surges, and voltage sags caused by sources outside the facility. Power distribution, grounding, bonding and shielding of electrical system within the facility is also part of the Pwr Sys - LRR.

Radar Automated Display System

The Radar Automated Display System (RADS) is the Air Traffic Controller workstation for the Automated Radar Terminal System Model IIE (ARTS IIE).

Radio Communication Link

Radio Communication Link (RCL) is an integrated voice and data microwave transmission system designed to provide the FAA with cost effective and reliable service for its high capacity NAS communications routes. RCL interconnects air route traffic control center (ARTCC) facilities with long range radar installations and other air traffic control (ATC) facilities.

Radio Control Equipment

Radio Control Equipment (RCE), located at both ATC facilities and remote communication sites, control the operation of remotely located ground to air Very High Frequency/Ultra High Frequency (VHF/UHF) radios used by air traffic controllers to communicate with pilots. RCE interfaces with the voice switch at the ATC facility, telephone landlines, and ground to air radios at the En Route Remote Communications Air/Ground (RCAG) sites, Terminal Remote Transmitter/Receiver (RTR) sites, and Flight Service Station Remote Communications Outlet (RCO) sites.

Rapid Deployment Voice Switch Type I

The Rapid Deployment Voice Switch Type I (RDVS I) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS I (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the RDVS I. The RDVS I (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the RDVS I.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS I systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Rapid Deployment Voice Switch Type II

The Rapid Deployment Voice Switch Type II (RDVS II) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS II (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the RDVS II. The RDVS II (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the RDVS II.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate

RDVS II systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Rapid Deployment Voice Switch Type IIA

The Rapid Deployment Voice Switch Type IIA (RDVS IIA) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS IIA (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. The RDVS IIA also supports air-to-ground (A/G) radio connectivity between ATCT controllers and pilots. The RDVS IIA (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between TRACON controllers and pilots is also supported by the RDVS IIA.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS IIA systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Remote Automated Radar Terminal System (ARTS) Color Display

Remote Automated Radar Terminal System Color Display (R-ACD) Description The Remote - Automated Radar Terminal System (ARTS) Color Display (ACD) is a high performance, full function, and color display providing air traffic controllers with the functionality of the Digital Bright Radar Indicator Tower Equipment (DBRITE). This display supports keyboard and trackball functions for the ARTS II, ARTS IIE, and ARTS IIIE. A radar gateway function will be incorporated to provide a primary and secondary radar data path to the R-ACD in the event of failure of both the ARTS II and ARTS IIIA processing systems.

Satellite Communication Airborne Radios

The Satellite Communication (SATCOM) airborne radios are transceivers installed in commercial, cargo, and military aircraft transiting in the National Airspace System (NAS) and are used as an alternate means of voice communications between pilots in aircraft and ground controllers. These transceivers are typically used in transoceanic applications.

Satellite Communication Ground Radios

Satellite Communications (SATCOM) Ground Radios are transceivers installed at oceanic and en route facilities to support an alternative means of tactical air traffic control (ATC) voice communications between ground controllers and pilots in aircraft. These transceivers are typically used in transoceanic applications. These transceivers are also installed at regional facilities and used as an alternate means of communications in case of total ground communications failure or between locations in mountainous terrain or where other means of communications are not possible (e.g., Alaska).

Oceanic air to ground satellite communications are provided via a communications service provider. The FAA currently has no plans to develop or implement its own air to ground SATCOM ground radios.

Small Tower Voice Switch

The Small Tower Voice Switch (STVS) is installed in small Airport Traffic Control Towers (ATCT) and in Flight Service Stations (FSS). The basic STVS has four operator positions. The STVS provides the Air Traffic Control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and Air Route Traffic Control Center (ARTCC) controllers/ Terminal Radar Approach Control (TRACON) controllers/FSS specialists/air traffic control system command center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the STVS. The STVS (installed in the FSS) provides the ATC operational G/G voice communications interconnectivity between specialists within an FSS (intercom), interconnectivity between specialists in separate FSSs (interphone), and interconnectivity between FSS specialists and Air Route Traffic Control Center (ARTCC) controllers/Terminal Radar Approach Control (TRACON) controllers/ATCT controllers/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground radio connectivity between FSS specialists and pilots is also supported by the STVS.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate STVS systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Standard Automation Platform Convergence Phase 1 (key system)

The purpose of Standard Automation Platform Convergence Phase 1 (SAP Conv P1) is to reduce both procurement and recurring costs by standardizing and sharing as many hardware and software ATC Automation components as possible.

An engineering convergence task will begin in fiscal year 2005 and run through 2015. All components from each of the automation systems (STARS, ERAM, TFM, etc.) will be analyzed, and the "best of breed" and "core" components will be selected. SAP convergence will be performed in the following areas: (1) Hardware; (2) System Software (operating systems, Commercial-Off-The-Shelf tools, etc.); (3) ATC applications that can be shared across domains; (4) ATC applications that are unique to a domain; and (5) ATC system support tools that can be shared across domains (adaptation, data extraction or systems analysis recording, data reduction and analysis tools, etc.). Proven STARS and ERAM components will be slected, integrated into the SAP, and rigorously tested for replacing STARS and ERAM components at or near their end of service life.

Prototyping begun under Phase 1 will continue with SAP Conv P2. The results of both efforts will lead to refining the requirements to develop the SAP WS mechanism with SDP and FOMS applications.

Standard Automation Platform Workstation Phase 1 (key system)

The SAP consists of the Flight Object Management System (FOMS), the Surveillance Data Processor (SDP), and the SAP Workstation. The SAP will be installed in En Route and Arrival/Departure facilities. The SDP performs surveillance data processing and tracking on Surveillance Data Objects received from the Surveillance Data Network. The FOMS performs flight plan processing, associates flight and track data, and publishes the Flight Object on the System Wide Information Management network. The SAP workstation provides the controller interface for the FOMS and SDP.

Standard Terminal Automation Replacement System

The Standard Terminal Automation Replacement System (STARS) processes primary and secondary radar information to acquire and track data points to display aircraft position for controllers. STARS provides safety tools such as, conflict alert (CA), Mode C intruder (MCI), final monitoring aid (FMA), Minimum Safe Altitude Warning (MSAW), Converging Runway Display Aid (CARDA), and Controller Automated Spacing Aid (CASA). Also, STARS provides the capability to implement the following enhancements: improved radar processing, Global Positioning System (GPS) compatibility, adaptive routing, Center Terminal Radar Approach Control (TRACON) Automation System (CTAS), data link implementation, improved weather display, and better utilization of traffic management information.

Standard Terminal Automation Replacement System Terminal Controller Workstation

The Standard Terminal Automation Replacement System Terminal Controller Workstation (STARS TCW) provides the interface between the Terminal Radar Approach Control (TRACON) controller and the STARS processing unit.

Surveillance Data Network (key system)

National Airspace System (NAS) surveillance systems, including radar and automatic dependent surveillance systems will provide surveillance data objects via the Surveillance Data Network (SDN), which is a sub-network of the System Wide Information Management (SWIM) and the FAA Telecommunication Infrastructure (FTI). The published Surveillance Data Objects (SDO) will be made available to NAS and other users, including the Transportation Security Administration, Department of Defense, and others. Surveillance data availability supports 3-mile separation standards, gate-to-gate traffic management, seamless airspace, and dynamic resectorization. Improved surveillance information is provided in a timely and consistent manner seamlessly across the NAS for operations, planning, and decision making. The information will be available to all users and service providers via SDO in near real time. This information enables decisions to be based on a shared common view of situations, even as conditions are changing. Improved surveillance with SDOs will provide the automation higher quality of data for seamless surveillance and, in combination with other capabilities and new procedures, enable capacity and safety improvements. These benefits accrue from increased situation awareness by decision makers and improved operation of decision support and analysis tools that use surveillance information.

Surveillance Data Processor (key system)

SDP is a component of SAP and operates in En Route and Terminal. The SDP will make improvements to sensors and automation systems that will allow for expanded use of 3-mile separation and terminal procedures. The operational improvements enable more efficient control of aircraft and use of airspace. To accomplish this, all 1030/1090 Beacon interrogators will be upgraded to disseminate their existing 1.2 milli-radian azimuth accuracy and other information, such as time of measurement, confidence, quality, and so on. The automation system algorithms will be improved or new algorithms will be developed to exploit the additional information content of the improved surveillance reports. The method of presentation (display) to support 3-mile separation will be developed and tested to ensure safety. The existing long-range sensor surveillance update period is (12 seconds) and is insufficient to support 3-mile separation. In areas where only long-range sensors exist and where the Air Traffic Service requires 3-mile separation, these sensors may be modified to double the update rate to achieve 3-mile separation.

Surveillance Processor (Safe Flight 21)

The Surveillance Processor (Safe Flight 21) is a demonstration system that receives, processes, and distributes surveillance data between Safe Flight 21 (SF-21) architectural elements to support operational trials. The processor receives surveillance data from various sources, including surveillance sensors, Automatic Dependent Surveillance-Broadcast (ADS-B) systems, multilateration systems, Air Traffic Control (ATC) automation systems, and flight plan processing systems. The processor fuses the various surveillance data to create aircraft track data, which is distributed to various SF-21 architectural elements. One of the capabilities supported by the processor is the processing and distribution of Traffic Information Services - Broadcast (TIS-B) information to ADS (SF-21) Ground Stations, for subsequent transmission to aircraft.

Ultra High Frequency Airborne Radios

The Ultra High Frequency Avionics (UHF Avionics) are analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225-400 MHz frequency band, which are multi-channel transceivers, installed in an airborne military platform. These airborne devices support the tactical two-way voice communications/ coordination between the military pilot in the military aircraft and the controller on the ground.

Ultra High Frequency Ground Radios

Ultra High Frequency (UHF) Ground Radios are analog UHF amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 Mhz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and flight service station domains.

Ultra High Frequency Ground Radios - Replacement

The Ultra High Frequency Ground Radios - Replacement (UHF Ground Radios - Repl) mechanism represents analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 MHz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and Flight Service Station domains.

Very High Frequency / Ultra High Frequency Emergency Communications Transceivers - Terminal

Very High Frequency / Ultra High Frequency Emergency Communications Transceivers - Terminal (VHF/UHF ECT - Terminal) are analog VHF and UHF transceivers operating in either the 118 - 137 Mhz or 225 - 400 Mhz frequency bands. These transceivers are used in the terminal domain as emergency communications.

Very High Frequency Airborne Radios

Very High Frequency (VHF) Airborne Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 Mhz frequency band which are multi-channel transceivers installed in an airborne platform (e.g., commercial, cargo, and general aviation aircraft). These airborne devices support the tactical two-way voice communications/coordination between the pilot in the aircraft and the controller on the ground.

Very High Frequency Ground Radios

Very High Frequency (VHF) Ground Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 MHz frequency band which are single-channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the pilot in commercial, cargo, or general aviation aircraft in the oceanic, en route (i.e., ARTCC), terminal (i.e., TRACON/tower), and flight service station domains. Additionally, there are analog VHF frequency modulation (VHF - FM) radio devices operating in the 161 - 174 MHz frequency band that are multi-channel transceivers. These transceivers are used by flight inspection, aviation security, and airway facility specialists supporting local airport operations and maintenance or to perform their operational maintenance mission in support of the NAS. However, these same VHF-FM transceivers are also used to support the resolution of emergency situations or establish a level of voice command and control communications/coordination during disaster recovery.

Very High Frequency Mobile Radios

Very High Frequency (VHF) Mobile Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 Mhz frequency band which are multi-channel transceivers installed in surface vehicles (e.g., "follow-me," maintenance, administrative, and snow-removal vehicles). These devices support the tactical two-way voice communications/coordination between the operators in the vehicles and the tower controllers or airline operations personnel.

Very High Frequency Multi-Mode Airborne Radios

Very High Frequency Multi-Mode Airborne Radios (VHF MM Airborne Radios) refers to an airborne radio operating in the very high frequency (VHF) range capable of operating in the following modes: (1)) analog voice (i.e., 25 kHz spacing for use in the United States and other similarly equipped countries); (2) VHF Digital Link Mode 2 (VDL Mode-2) (two-way digital data transmission); (3) VHF Digital Link Mode 3 (VDL Mode-3), (integrated two-way digital voice/data transmission); and (4) analog voice (i.e., 8.33 kHz spacing for use in Europe and other similarly equipped countries).

Voice Switching and Control System

The Voice Switching and Control System (VSCS) is installed in the Air Route Traffic Control Center (ARTCC). The VSCS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The VSCS provides the Air Traffic Control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ARTCC (intercom), interconnectivity between controllers in separate ARTCCs (interphone), and interconnectivity between ARTCC controllers and Terminal Radar Approach Control (TRACON) controllers/Airport Traffic Control Tower (ATCT) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ARTCC controllers and pilots is also supported by the VSCS.

Voice Switching and Control System Modification (Technological Refresh)

The Tech Refresh for VSCS is a service life extension. The Tech Refresh encompasses workstation upgrade, video display monitor, control equipment power, VSCU supportability, control shelf power supply, and software development demonstration system expansion.

Voice Switching and Control System Training and Backup Switches

Voice Switching and Control System Training and Backup Switch (VTABS) was developed to meet AT requirements for a separate standalone VSCS Backup and Training System. VTABS can be configured as a 50-position switch with the capability to support air traffic operations in the event of VSCS failure, hardware and software maintenance or power loss.

Support Activities

AT Procedure Development for Enhanced Emergency Alerting Support

Air Traffic Procedures document air traffic services and how they are implemented. The introduction of new systems, or changes to existing systems, may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

AT Training for Enhanced Emergency Alerting Support

Air Traffic (AT) training is provided to the AT workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AT Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

FAA Certification for Enhanced Emergency Alerting Support

FAA certification is an activity necessary to support people and systems in the delivery of NAS services. Avionics and associated systems are deemed to be critical to the safety of flight and must be certificated. In addition certain operators and service providers require to be certified such as pilots, dispatchers and others. Certification will generally begin 24 months prior to Initial Operating Capability, and be complete prior to receiving or giving service.

Non-FAA Pilot Procedure Development for Enhanced Emergency Alerting Support

A number of NAS users document the way their activities are to be carried out. The introduction of new systems, or changes to existing systems may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development will generally begin once ATC procedures have been established and be complete by 90 days prior to Initial Operating Capability, in order to facilitate training.

Non-FAA Pilot Training for Enhanced Emergency Alerting Support

Non-FAA Pilot Training is provided to educate pilots as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional pilot training. Training will generally begin 60 days prior to IOC and be complete within one year following Full Operating Capability.

People

Flight Service Specialist

A Flight Service Specialist performs the following activities:

* Provide services to aircraft in flight and during the pre-flight phase,

* Monitoring and restoration of NAVAID; Issuing local airport advisories,

* Relaying ATC clearances, advisories or requests,

* Issuing military flight advisory messages,

* Receiving and issuing NOTAMS,

* Assisting is search and rescue communication searches,

* Activating and closing flight plans,

* Making unscheduled broadcasts,

* Soliciting and issuing PIREPS,

* Presenting pilot weather briefings to airborne aircraft,

* Locating lost aircraft,

* Recording aircraft contacts,

* Providing weather advisories and flight plan services,

* Providing hazardous area reporting services, and

* Keeping airmen and weather information current.

Ground Controller

A Ground Controller performs the following activities: Ensure separation; Control vehicles as well as aircraft on movement areas other than active runways Initiate control instructions; Monitor and operate communications equipment; Utilize tower radar display(s); Utilize alphanumerics; Assist the tower associate controller with coordination; Scan tower cab environment; Ensure computer entries and strip marking are completed for instructions or clearances issued or received; Process and forward flight plan information; Perform any functions of the tower team which will assist in meeting situation objectives; Coordinate with local control for safe and efficient use of runways and movement areas.

Local Controller

A Local Controller performs the following activities: Ensure separation; Control active runways; Initiate control instructions; Monitor and operate communications equipment; Utilize tower radar display(s); Utilize alphanumerics; Assist the tower associate controller with coordination; Scan tower cab environment; Ensure computer entries and strip marking are completed for instructions or clearances issued or received; Process and forward flight plan information; Perform any functions of the tower team which will assist in meeting situation objectives; Coordinate with ground control for safe and efficient use of runways and movement areas.

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Radar Controller

A Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate automated handoffs; Assist the radar associate controller with non-automated handoff actions when needed; Assist the radar associate controller in coordination when needed; Scan radar display; Correlate with flight progress strip information; Ensure computer entries are completed on instructions or clearances you issue or receive; Ensure strip marking is completed on instructions or clearances you issue or receive.

Rescue Coordination Center Specialist

Rescue Coordination Center People consist of personnel from the United States Coast Guard and the United States Air Force who receive information about overdue or missing aircraft from the FAA and coordinate the search and rescue activities within their respective regions.

Interfaces

Automatic Dependent Surveillance - Broadcast Avionics ← (Target Data) → Automatic Dependent Surveillance - Broadcast Avionics

Air-to-air ADS-B target data is exchanged between aircraft for use initially as a situation awareness enhancement. This capability will be expanded to other future applications, such as precision approach and landing and self separation.

Automatic Dependent Surveillance - Broadcast Avionics ← (Target Data) → BSGS Broadcast Services Ground Station

The GBT intercepts ADS-B transmissions from aircraft in the coverage area of the GBT. The GBT transmits ADS-B reports it receives down the UAT link back up the 1090 link and vice versa.

BSGS Broadcast Services Ground Station — (Weather Data) → Automatic Dependent Surveillance - Broadcast Avionics

ADS-B Avionics (with weather application) can receive FIS weather products broadcasted by the BSGS via an ADS-B data link.

Global Positioning System — (Position Data) → Automatic Dependent Surveillance - Broadcast Avionics

The GPS provides the range data that ADS-B Avionics processes to position data, which is broadcasted to other aircraft, ground vehicles, and ADS ground stations.

Surveillance Data Processor — (Surveillance Data) → BSGS Broadcast Services Ground Station

The SDP provides surveillance data for aircraft that are not responding to beacon interrogations or providing ADS-B reports to the GBT for transmission up both the UAT and 1090 links.

Surveillance Data Processor — (Surveillance Data) → Standard Automation Platform Workstation Phase 1

The SDP sends surveillance data to the SAP WS for display to the controller.

Issues

None

Service Group Air Traffic Services

Service Emergency and Alerting

Capability Emergency Assistance

Operational Improvement

Current Emergency Assistance (106101)

Direct support protects individuals and property both in the air and on the ground. Among other things, direct support includes location and navigation assistance for orientation, guidance to emergency airports, and generation of alternative courses of action.

01-Jan-2007 to 31-Jul-2008

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Air traffic service emphasizes emergency assistance for on-airport and airborne vehicles and aircraft. The Air Route Traffic Control Centers (ARTCC) and Terminal Radar Approach Controls (TRACON) provide emergency assistance services to flights in their delegated airspace. Airport Traffic Control Towers (ATCT) provides assistance to aircraft operating on the airport surface or in the airport traffic area. The Automated Flight Service Station/Flight Service Station (AFSS/FSS) facilities help with Visual Flight Rules flights that are in contact with the En Route Flight Advisory Service position. AFSS/FSS also help find aircraft experiencing emergencies via direction finding (DF) equipment. Pilots participate in emergency assistance by relaying radio transmissions that air traffic facilities do not receive and by using the designated transponder codes to signal emergency conditions.

The ARTCCs serve as the central points for collecting information on overdue or missing Instrument Flight Rules aircraft and for coordinating with Search and Rescue on those flights. The ARTCC also conducts communications searches by distributing any necessary alert notices. In addition, the ARTCC provides direct assistance to an aircraft experiencing an emergency situation while operating in their assigned airspace. ARTCC radar controllers receive emergency information and requests for assistance via the air-to-ground radio, Voice Switch and Control System, from transponder codes as integrated by the Air Traffic Control Beacon Interrogator or Mode Select Beacon System radar, and also as relayed from other aircraft. When an aircraft declares an emergency and request to land as quickly as possible, the ARTCC radar controller uses data from the Air Route Surveillance Radar and the Display System Replacement equipment to locate suitable airports, and then relay information about the emergency to the ATCT. If there is no ATCT, the information is relayed to the airport operator. This advance information allows airfield fire fighting and rescue personnel to prepare for the arrival of the aircraft in distress. If time permits, and a flight experiencing an emergency elects to continue to its destination, the controller enters the information in the Flight Data Input/Output system. The Host Computer System processes the information and provides it to the sectors that the flight will enter, giving all the controllers the necessary information to assist the aircraft.

The Emergency Voice Communications System (EVCS) provides emergency voice communications to meet national security and emergency preparedness responsibilities dictated by Presidential Order and interagency agreements. The EVCS supports headquarters and Regional Communications Command Centers' functions for accident and incident reports, hijacks, airline crashes, aviation security matters, military activities, natural disasters, etc.

The TRACON serves a similar function for an aircraft experiencing an emergency within their delegated airspace. The TRACON radar controller uses data from the Airport Surveillance Radar and the Automated Radar Terminal System to locate suitable emergency airports, and can access more detailed information in the Automated Surface Observing System (ASOS) Controller Equipment/Information Display System. Radio and landline communication is accomplished through the Integrated Communication Switching System (ICSS), Enhanced Terminal Voice Switching (ETVS), or Rapid Deployment Voice Switch systems.

The ATCT provides emergency assistance to aircraft operating on the surface of the airport and in the tower airspace. Information is received via the Small Tower Voice Switch, ICSS, or ETVS on flights that are being transferred from either the ARTCC or the TRACON. In addition, local controllers use the Digital Bright Radar Indicator Tower Equipment, which provides a television type display of air traffic and weather data, to display emergency transponder codes. They also observe predetermined covert signals from an aircraft operating on the surface of the airport. Ground or local controllers activate crash phone circuits to alert airport rescue personnel. The ground controller assists the emergency vehicles in reaching the distressed aircraft, or in positioning equipment for optimum response. Current weather information is provided through direct reading instruments such as Low Level Wind Shear Alert System, Terminal Doppler Weather Radar, and from ASOS.

The AFSS is normally the facility on the DF net. The specialist requests that the flight transmit on its radio, the DF equipment shows the bearing of the transmission from the DF site location. If two sites can receive the transmission, the intersection of the two bearings pinpoints the exact location of the aircraft. Weather data is displayed on the flight service automation system Model 1 Full Capacity, or its replacement, the Operational and Supportability Implementation System.

SPACE OPERATIONS - National Aeronautics and Space Administration (NASA) or military launch and landing operations - including unmanned weather rocket launches, unmanned missile launches, Space Shuttle launches and landings, and Space Shuttle training operations - require coordination between the Department of Defense (DoD), NASA, and the FAA. Several FAA centers in the affected areas are impacted by these activities.

In the event of a Space Shuttle emergency, any civil or DoD installation with a 10,000-foot or longer runway could potentially be called upon to support an emergency landing. In the event of an emergency landing within the United States, the Johnson Space Center Mission Control will relay all required airspace requests to the FAA ATCSCC for coordination with appropriate ARTCC and Center Radar Approach Control (CERAP) facilities. ARTCC/CERAP facilities will coordinate with affected terminal or AFSS/FSS facilities. For an emergency landing outside the continental United States, but in airspace under United States jurisdiction, oceanic air traffic control facilities coordinate with other air traffic control facilities or governments as appropriate or feasible. If unable to broadcast a prior notification message, the Space Shuttle Orbiter crew attempts to contact the intended airfield on the 243.0-megahertz emergency channel approximately 12 minutes prior to touchdown.

Upon receiving notification of an emergency landing, air traffic control responsibilities are to clear affected airspace as quickly as possible, alert the available fire/crash/rescue equipment to respond using standard fire fighting protective equipment and self-contained breathing apparatuses, and ensure appropriate authorities are notified to prevent access by unauthorized personnel within 400 meters of the Space Shuttle Orbiter due to toxic fuels onboard.

Benefits

Current operations are provided in the NAS.

Systems

Air Route Surveillance Radar - Model 1E (key system)

The Air Route Surveillance Radar - Model 1E (ARSR-1E) is a 1970s analog radar. It is a long-range radar system with a maximum detection range of 200 nm. The ARSR-1E is a surveillance system used to detect azimuth and slant range of en route aircraft operating between terminal areas. It also provides weather intensity data.

Air Route Surveillance Radar - Model 2 (key system)

The Air Route Surveillance Radar - Model 2 (ARSR-2) is a 1970s analog radar. It is a long-range radar system with a maximum detection range of 200 nm. The ARSR-2 is a surveillance system used to detect azimuth and slant range of en route aircraft operating between terminal areas. It also provides weather intensity data.

Air Route Surveillance Radar - Model 3 (key system)

The Air Route Surveillance Radar - Model 3 (ARSR-3) is a 1980s radar that provides primary long range surveillance data, including slant range and azimuth data. It processes the returns which includes demodulation, analog-to-digital conversion, moving target indicator function, sensitivity time control, range and azimuth gating, and digital target extraction - all of which are performed digitally (with the exception of the demodulation and analog-to-digital conversion). In addition, the ARSR-3 has a weather channel with associated processing to provide weather contour information in digital format.

Air Route Surveillance Radar - Model 4 (key system)

The Air Route Surveillance Radar - Model 4 (ARSR-4) is a three-dimensional, long-range, rotating phased array, primary surveillance radar with integrated height finder capability. It is part of the joint surveillance system (JSS) used in conjunction with ARSR-3 coverage as part of the nationwide air defense command surveillance network. In addition to functions peculiar to the military, the ARSR-4 performs the same basic functions of the ARSR-3, by providing primary long-range surveillance data, including slant range and azimuth data.

Air Traffic Control Beacon Interrogator - Model 4 (key system)

The Air Traffic Control Beacon Interrogator - Model 4 (ATCBI-4) is an air traffic control (ATC) beacon system that interrogates transponder-equipped aircraft. It is a secondary radar system that interrogates transponders, receives aircraft identification, and determines position data.

Air Traffic Control Beacon Interrogator - Model 5 (key system)

The Air Traffic Control Beacon Interrogator - Model 5 (ATCBI-5) is an air traffic control (ATC) beacon system that interrogates transponder-equipped aircraft. It is a secondary radar system that interrogates transponders, receives aircraft identification, and determines position data.

Air Traffic Control Beacon Interrogator - Model 6 (key system)

The Air Traffic Control Beacon Interrogator Model 6 (ATCBI-6) is a ground-based system that interrogates transponders, receives and processes replies from transponders, determines the range and azimuth to the aircraft, and forwards the information to appropriate air traffic control (ATC) automation systems. Replies provide identification and altitude data of the transponder.

Airport Surveillance Radar - Model 11 (key system)

The Airport Surveillance Radar- Model 11 (ASR-11) is a digital, combined primary and secondary surveillance radar (SSR), short-range radar system with a 60 nautical mile (nmi) detection range for medium and small activity airports. The ASR-11 provides advanced digital primary radar including weather intensity surveillance with an integrated monopulse SSR system for use in the airport terminal area. The ASR-11 is used to detect and report the presence and location of an aircraft in a specific volume of airspace. The ASR-11 provides search radar surveillance coverage in controlled airspace primarily in terminal areas.

Airport Surveillance Radar - Model 7 (key system)

The Airport Surveillance Radar - Model 7 (ASR-7) is a short-range (60 nm) analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the Air Traffic Control Beacon Interrogator - Model 4 or Model 5 (ATCBI-4 or ATCBI-5) or Mode S. This system will be replaced by the ASR-11.

Airport Surveillance Radar - Model 8 (key system)

The Airport Surveillance Radar - Model 8 (ASR-8) is a short-range (60 nm), analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the Air Traffic Control Beacon Interrogator - Model 4 or Model 5 (ATCBI-4 or ATCBI-5) or Mode S.

Airport Surveillance Radar - Model 9 (key system)

The Airport Surveillance Radar - Model 9 (ASR-9) is a short range (60 nm) radar system for the airport terminal area. The ASR-9 processes the returns from aircraft targets, which includes demodulation, analog-to-digital conversion, range and azimuth gating, sensitivity timing control, and a moving target detection function. The moving target detector includes two-level weather contour processing, digital signal processing, correlation and interpolation processing, and surveillance processing. The ASR-9 has a separate weather channel with associated processing capable of providing six-level weather contours. The two-level weather contour processing associated with the moving target detector is only be used for backup. The six-level weather channel is primarily used to supplement Next Generation Weather Radar (NEXRAD) coverage. It is normally used in conjunction with Mode Select (Mode S) but it can accommodate an Air Traffic Control Beacon Interrogator

Model 4/5 (ATCBI-4/5).

The ASR-9 will be upgraded/replaced with the ASR-9/Mode S SLEP (see separate mechanism) in the 2007-12 time frame.

Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) (key system)

The Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) (ASR-9/Mode S (SLEP)) mechanism provide the necessary technical refresh to extend the service life of the ASR-9 and Mode S through 2030. The ASTERIX upgrade has not been implemented, but will be implemented at a later date.

Airport Surveillance Radar, Military (key system)

The GPN-20 radar is a military short-range (60 nm) analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the TPX-42 military beacon (interrogate friend or foe, IFF). The GPN-20 is the military version of the FAAs ASR-7/8.

Automated Radar Terminal System - Model IIE (key system)

The Automated Radar Terminal System - Model IIE (ARTS IIE) provides radar data processing (RDP) and decision support tools to the controller in the terminal environment. Utilized at low to medium-size Terminal Radar Control (TRACONs) Facilities the ARTS IIE is capable of receiving input from up to 2 sensors, can process up to 256 tracks simultaneously, and support up to 22 displays. The ARTS IIE implements the Common ARTS software for improved performance maintenance efficiency. The radar data processing (RDP) software provides automated surveillance tracking and display processing. Included in the ARTS IIE software are decision support tools such as Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Mode C intruder alert, Converging Runway Display Aid (CRDA), and Controller Automation Spacing Aid (CASA).

Automated Radar Terminal System - Model IIIA (key system)

The Automated Radar Terminal System - Model IIIA (ARTS IIIA) provides radar data processing (RDP) and decision support tools to the controller in the terminal environment. Utilized at larger airports, ARTS IIIA is capable of receiving input from up to three sensors, can process up to 900 tracks simultaneously and support up to 36 displays. The RDP software provides automated surveillance tracking and display processing. Included in the ARTS IIIA software are decision support tools such as Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Mode C intruder alert, Converging Runway Display Aid (CRDA), Final Monitor Aid (FMA), and controller automation spacing aid.

Automated Radar Terminal System - Model IIIE (key system)

The Automated Radar Terminal System - Model IIIE (ARTS IIIE) consists of the hardware platform and software required providing radar data processing (RDP) and decision support tools to the controller in the terminal environment. The ARTS IIIE is used at consolidated Terminal Radar Approach Control (TRACON) facilities. The Common ARTS program provided an ARTS IIIE capable of receiving input from up to 15 sensors, the ability to process up to 10,000 tracks simultaneously, and support up to 223 displays. The RDP software provides automated surveillance tracking and display processing including mosaic display of radar data. Included in the ARTS IIIE software are decision support tools such as Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Mode C intruder alert, Converging Runway Display Aid (CRDA), Final Monitor Aid (FMA), and controller automation spacing aid.

Automated Radar Terminal System Color Display (key system)

The Automated Radar Terminal System (ARTS) Color Display (ACD) is a high performance, full function, color display that replaces the Full Digital ARTS Display (FDAD) and the Data Entry and Display Subsystem (DEDS). The ACD supports keyboard and trackball functions for the ARTS IIA, ARTS IIE, and ARTS IIIE. A primary and secondary radar data path to the ACD is provided by a radar gateway function incorporated in the event of a failure of either the ARTS IIE and ARTS IIIA processing systems.

Automatic Dependent Surveillance (Capstone) Ground Station

The Automatic Dependent Surveillance (Capstone) Ground Station (ADS (Cap) Ground Station) is a demonstration system used by the Capstone project under Safe Flight 21. It receives Global Positioning System (GPS)-derived aircraft four (4)-dimensional position data, aircraft identification, aircraft velocity, and other selected aircraft data for processing at ATC facilities, and transmits Traffic Information System - Broadcast (TIS-B) information on aircraft in areas of radar coverage (and other airspace status information when available) to properly to equipped aircraft, to support operational trials. These ground stations are located in remote locations in Alaska, and feed the Anchorage Air Route Traffic Control Center (ARTCC) automation system.

Digital Airport Surveillance Radar (key system)

The Digital Airport Surveillance Radar (DASR) provides advanced digital primary radar including weather intensity surveillance with an integrated mono-pulse Secondary Surveillance Radar (SSR) system for use in the airport terminal area. (Military version of ASR-11)

Digital Bright Radar Indicator Tower Equipment

The Digital Bright Radar Indicator Tower Equipment (DBRITE) is a tower display system that provides a raster scan presentation of radar/beacon videos and automation system alphanumeric data. The system accepts radar, beacon, external map, analog data, and automation system data.

Digital Voice Recorder System (key system)

Provides modern digital voice recording devices used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

In Feburary 2004, the DVRS was upgraded with a 24-channel card, which replaced the 16-channel card. This minor upgrade, called DVR II, was not extended to the systems installed prior to February 2004.

Digital Voice Recorder System Replacement

The Digital Voice Recorder System Replacement (DVRS Replacement) is a modern digital system used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

Direct Access Radar Channel

The Direct Access Radar Channel (DARC) provides a back-up processing path to provide surveillance data to the displays in the event of a primary channel (Host Computer System (HCS) failure. The DARC path is a physically, logically and electrically separate processing path (with diverse hardware and software) from the primary Host Computer System (HCS) Radar Data Processing (RDP) paths. Thus DARC provides a tertiary path, to keep radar data on the controller''s displays, should both HCS RDP paths be disabled for any reason. The DARC provides radar data processing, very limited flight data processing, but with significantly less functionality than the HCS. Basically, DARC serves as a lifeboat should both HCS processing paths become disabled.

Display System Replacement (key system)

The Display System Replacement (DSR) provides continuous real-time, automated support to air traffic controllers for the display of surveillance, flight data and other critical control information. This information is processed by the Host and Oceanic Computer System Replacement (HOCSR) and the Enhanced Direct Access Radar Channel (EDARC) subsystems. The DSR provides controller workstations, displays, and input/output devices and a communications infrastructure to connect the DSR with external processing elements of the en route ATC automation system.

Emergency Voice Communications System (key system)

The Emergency Voice Communications System (EVCS) is located at Headquarters (HQ), Regional Offices, several Air Route Traffic Control Centers (ARTCCs), Terminal Radar Approach Control (TRACON) facilities, and other selected sites. EVCS uses two (2) dedicated Federal Telecommunications Service 2001 (FTS2001) dial access channels at most FAA locations. Dedicated dial lines using the Public Switched Telephone Network (PSTN) are used at locations not having direct access to FTS2001. Supports HQ and Regional Communications Command Centers'' functions for accident and incident reports, hijacks, aircraft crashes, aviation security matters, military activities, natural disasters, etc.

Enhanced Back-up Surveillance

The Enhanced Back-Up Surveillance (EBUS) system replaces the DARC system in use at the 20 Air Route Traffic Control Centers (ARTCC) in the contiguous United States (CONUS), the William J. Hughes Technical Center (WJHTC), and the FAA Academy (FAAAC). The EBUS design employs the existing FAA-certified software of the Microprocessor En Route Automated Radar Tracking System (Micro-EARTS) application to provide radar data processing (RDP) services for the replacement legacy backup system. Micro-EARTS provides key capabilities not supported by the DARC legacy system it replaces, among which are the safety functions of Conflict Alert (CA), Mode-C Intruder (MCI), and Minimum Safe Altitude Warning (MSAW). EBUS also provides Next Generation Radar (NEXRAD) weather data to R-position users via the DSR Backup Communications Network (BCN). EBUS makes the R-position functionality on the backup channel more comparable to that of the primary channel.

The EBUS software (Micro EARTS) and the ECG backup gateway software will share the same hardware platform such that both software functions will reside in the same ECG backup gateway hardware platform.

Enhanced Terminal Voice Switch (key system)

The Enhanced Terminal Voice Switches (ETVS) are installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) facilities with more than four air traffic controller positions. The ETVS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The ETVS (installed in the ATCT) provides the ATC operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the ETVS.

The ETVS (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within a TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the ETVS.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate ETVS systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Fixed Position Surveillance - Model 117

The Fixed Position Surveillance - Model 117 (FPS-117) radar is a joint-use military surveillance system used by the FAA to detect slant range and azimuth of en route aircraft. These radars are located in Alaska (12) and Hawaii (1), and are expected to be sustained until at least 2020.

Fixed Position Surveillance Model 20 Series

The Fixed Position Surveillance Model 20 Series (FPS-20 Series) is a military primary radar of various models (FPS-20A, FPS-64, FPS-66A, FPS-67/A/B, and ARSR-60M) used by the FAA to detect slant range and azimuth of en route aircraft operating between terminals in the continental United States. Each of the different radar models is a similar variation of the original FPS-20 military radar.

Flight Data Input/Output (key system)

The Flight Data Input/Output (FDIO) system provides flight progress information for use by the Tower, Terminal Radar Approach Control (TRACON) and Air Route Traffic Control Center (ARTCC) controllers. The FDIO system allows Air Traffic Control (ATC) Specialists to input automated flight data, perform data manipulation, and print flight strips.

Full Digital Automated Radar Terminal System Display (key system)

Full Digital ARTS Display (FDAD) is the fully digital ARTS display system that provides the display and data input devices for terminal controllers using ARTS IIIE and ARTS IIIA. The FDAD can work in analog video time share mode or full digital mode. The present application is analog video time share mode.

Heating, Ventilation and Air Conditioning - Long-Range Radar (key system)

The Heating, Ventilation and Air Conditioning - Long-Range Radar (HVAC - LRR) mechanism provides the systems to maintain the temperature and relative humidity within the facility at acceptable levels for LRR system operation or personnel comfort as required. This includes filtering of air to Occupational Safety and Health Administration (OSHA) requirements.

High Frequency Airborne Radios (key system)

High Frequency (HF) Airborne Radios are analog (HF multi-channel radio transceivers operating in the 2 - 30 Mhz frequency band installed in airborne commercial, cargo, and military aircraft transiting the oceanic, en route, terminal, or flight service station airspace domains. These transceivers are typically used in transoceanic applications.

High Frequency Ground Radios (key system)

High Frequency (HF) Ground Radios are analog HF radio devices operating in the 2 - 30 Mhz frequency band, which may be single channel transmitters and receivers or multi-channel transceivers. These radio devices are installed at oceanic and en route facilities and used to support tactical air traffic control (ATC) voice communications between a ground controller and a pilot in an aircraft in the oceanic domain. Additionally, these devices are also installed at regional facilities and used to support voice command and control communications /coordination in emergency or during disaster recovery situations occurring in the NAS.

Host Computer System (key system)

The Host Computer System (HCS) receives and processes surveillance reports, and flight plan information. The HCS sends search/beacon target, track and flight data, surveillance and alphanumeric weather information, time data, traffic management advisories and lists to the (Display System Replacement) DSR. The HCS associates surveillance-derived tracking information with flight-planning information. The DSR sends requests for flight data, flight data updates, and track control messages to the HCS. HCS-generated display orders are translated for use within the DSR workstation. While radar data processing is distributed among the terminal and En Route computer resources, the HCS performs virtually all of the flight data processing for its entire geographical area of responsibility. Every tower (ATCT) and terminal radar approach control (TRACON) relies exclusively on its parent HCS for flight data.

The HCS also runs algorithms that perform aircraft to aircraft (conflict alert) and aircraft to terrain (Minimum Safe Altitude Warning) separation assurance. The HCS algorithms provide visual and audible alerting to the controller when conflicts are identified.

The HCS presently supplies real time surveillance, flight data and other information to several decision support tools housed in collocated outboard processors connected via two-way high bandwidth links to the HCS and DSR. These are the (User Request Evaluation Tool, (URET), and the Traffic Management Advisory (TMA. URET performs probing of tentative flight plan changes to determine their viability. TMA provides sequencing and spacing information to align the aircraft in En Route airspace for approach.

Integrated Communications Switching System Type I (key system)

The Integrated Communications Switching System Type I (ICSS I) are installed at Airport Traffic Control Towers (ATCT), Terminal Radar Approach Control (TRACON) facilities, and Automated Flight Service Stations (AFSS).

The ICSS I (installed in the ATCT) provides the air traffic control (ATC) operational ground-ground voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/air traffic control system command center (ATCSCC) specialists. Ground-air radio connectivity between ATCT controllers and pilots is also supported by the ICSS I.

The ICSS I (installed in the TRACON) provides the ATC operational ground-ground voice communications interconnectivity between controllers within TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Ground-air radio connectivity between TRACON controllers and pilots is also supported by the ICSS I.

The ICSS I (installed in the AFSS) provides the ATC operational ground-ground voice communications interconnectivity between specialists within an AFSS (intercom), interconnectivity between specialists in separate AFSSs (interphone), and interconnectivity between Flight Service Station (FSS) specialists and Air Route Traffic Control Center (ARTCC) controllers/TRACON controllers/ATCT controllers/Air Traffic Control System Command Center (ATCSCC) specialists. Ground-air radio connectivity between AFSS specialists and pilots is also supported by the ICSS I.

Integrated Communications Switching System Type II (key system)

The Integrated Communications Switching System Type II (ICSS II) are installed at Airport Traffic Control Towers (ATCT), Automated Flight Service Stations(AFSS), and Terminal Radar Approach Control (TRACON) facilities.

The ICSS II (installed in the ATCT) provides the air traffic control (ATC) operational ground-ground voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Ground-air radio connectivity between ATCT controllers and pilots is also supported by the ICSS II.

The ICSS II (installed in the TRACON) provides the ATC operational ground-ground voice communications interconnectivity between controllers within TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC)) controllers/ Flight Service Station (FSS) specialists/air traffic control system command center (ATCSCC) specialists. Ground-air radio connectivity between TRACON controllers and pilots is also supported by the ICSS II.

Integrated Communications Switching System Type III (key system)

The Integrated Communications Switching System Type III (ICSS III) is installed at Automated Flight Service Stations (AFSS). The ICSS III (installed in the AFSS) provides the air traffic control (ATC) operational ground-to-ground (G/G)voice communications interconnectivity between specialists within an AFSS (intercom), interconnectivity between specialists in separate AFSSs (interphone), and interconnectivity between Flight Service Station (FSS) specialists and Air Route Traffic Control Center (ARTCC) controllers/Terminal Radar Approach Control (TRACON) controllers/ATCT controllers/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between AFSS specialists and pilots is also supported by the ICSS III.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate

RDVS II systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Leased Inter-facility National Airspace System Communication System

The Leased Inter-facility National Airspace System Communication System (LINCS) provides transmission channels of various industry-standard types between any specified end points, used to satisfy all FAA operational and some administrative telecommunication requirements.

Low-Density Radio Communications Link (key system)

The Low-Density Radio Communications Link (LDRCL) is an FAA owned Low-Density Radio Communications Link (LDRCL) satisfies short-haul, low-density communication requirements. It provides user access (via tail circuits) to a Radio Communications Link (RCL) site or connectivity between two operational facilities

Microprocessor-En Route Automated Radar Tracking System (key system)

The Microprocessor-En Route Automated Radar Tracking System (Micro-EARTS) is a radar processing system implemented with Commercial Off-the-Shelf (COTS) equipment, for use in both En Route and Terminal environments. It provides single sensor and a mosaic display of traffic and weather using long- and short-range radars. At Anchorage, Alaska, Micro-EARTS also provides Automatic Dependent Surveillance-Broadcast (ADS-B) surveillance and display. Micro-EARTS interfaces with multiple types of displays, including Display System Replacement (DSR), Digital Bright Radar Indicator Tower Equipment (DBRITE), and the flat panel tower controller displays.

Mode 3/AC Transponder (key system)

A Mode 3/AC Transponder (Mode 3/AC XPNDR) is a device that responds to an Air Traffic Control Radar Beacon System (ATCRBS) or Mode S interrogation by transmitting a 12-bit code that identifies an aircraft. Mode 3 is the military identity mode. Mode A is the civil identity mode. Mode 3 and Mode A are reported in identical formats and are called Mode 3/A. The Mode 3/A code in the field consists of 12-bits divided into four groups (A, B, C, and D) of three bits each. The Mode 3/A identity code consists of only four digits, each digit being the octal representation of one of the four groups in the field and listed in the order ABCD. A Mode C transponder is a device that responds to a Air Traffic Control Radar Beacon System (ATCRBS) or a Mode Select (Mode S) interrogation by transmitting an altitude gray code from the aircraft blind altitude encoder.

Mode Select Transponder (key system)

The Mode Select Transponder (Mode S Transponder) is an avionics system that responds to 1,030 MHz interrogations from ground-based sensors or Traffic Alert and Collision Avoidance System (TCAS) airborne avionics with 1,090 MHz replies containing aircraft identification, altitude, and other selected data. Mode S transponders offer improvements over conventional Air Traffic Control Radar Beacon System (ATCRBS) transponders in that they provide over 16 million unique beacon codes, can be selectively interrogated to prevent overlapping or garbling of replies from proximate aircraft, and can provide a high-capacity air-ground data link. In addition to responding to "all call" or "roll call" interrogations from ground-based sensors or TCAS avionics, the Mode S transponders are required to transmit or squitter their 24-bit unique identity and altitude once per second. These squitters are "voluntary" or automatic and not in response to any interrogation. The squitters allow TCAS avionics in proximate aircraft or other systems to acquire Mode S equipped aircraft by only listening on 1,090 MHz.

Multi-Mode Digital Radios (key system)

Multi-Mode Digital Radios (MDRs) are ground-based Very High Frequency (VHF) air-traffic-control radios that can operate in several configurations: 1) analog voice with 25kHz channel spacing; 2) analog voice with 8.33 kHz channel spacing; and 3) VHF Data Link (VDL) Mode-3 which consists of two-way digital voice and data communication.

Peripheral Adapter Module Replacement Item (key system)

The Peripheral Adapter Module Replacement Item (PAMRI) is an interface peripheral to the HOCSR. It provides a conduit through which the HOCSR receives and exchanges data, primarily radar data, flight data and interfacility data. The PAMRI converts communication protocols and translates data formats so the Host and EDARC can communicate with external devices.

Power System - Long-Range Radar (key system)

The Power System - Long-Range Radar (Pwr Sys - LRR) mechanism provides conditioning of commercial power, including uninterruptible power systems (UPS), to eliminate voltage dropouts, surges, and voltage sags caused by sources outside the facility. Power distribution, grounding, bonding and shielding of electrical system within the facility is also part of the Pwr Sys - LRR.

Radar Automated Display System (key system)

The Radar Automated Display System (RADS) is the Air Traffic Controller workstation for the Automated Radar Terminal System Model IIE (ARTS IIE).

Radio Communication Link (key system)

Radio Communication Link (RCL) is an integrated voice and data microwave transmission system designed to provide the FAA with cost effective and reliable service for its high capacity NAS communications routes. RCL interconnects air route traffic control center (ARTCC) facilities with long range radar installations and other air traffic control (ATC) facilities.

Radio Control Equipment (key system)

Radio Control Equipment (RCE), located at both ATC facilities and remote communication sites, control the operation of remotely located ground to air Very High Frequency/Ultra High Frequency (VHF/UHF) radios used by air traffic controllers to communicate with pilots. RCE interfaces with the voice switch at the ATC facility, telephone landlines, and ground to air radios at the En Route Remote Communications Air/Ground (RCAG) sites, Terminal Remote Transmitter/Receiver (RTR) sites, and Flight Service Station Remote Communications Outlet (RCO) sites.

Rapid Deployment Voice Switch Type I (key system)

The Rapid Deployment Voice Switch Type I (RDVS I) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS I (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the RDVS I. The RDVS I (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the RDVS I.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS I systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Rapid Deployment Voice Switch Type II (key system)

The Rapid Deployment Voice Switch Type II (RDVS II) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS II (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the RDVS II. The RDVS II (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the RDVS II.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS II systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Rapid Deployment Voice Switch Type IIA (key system)

The Rapid Deployment Voice Switch Type IIA (RDVS IIA) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS IIA (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. The RDVS IIA also supports air-to-ground (A/G) radio connectivity between ATCT controllers and pilots. The RDVS IIA (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between TRACON controllers and pilots is also supported by the RDVS IIA.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS IIA systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Remote Automated Radar Terminal System (ARTS) Color Display (key system)

Remote Automated Radar Terminal System Color Display (R-ACD) Description The Remote - Automated Radar Terminal System (ARTS) Color Display (ACD) is a high performance, full function, and color display providing air traffic controllers with the functionality of the Digital Bright Radar Indicator Tower Equipment (DBRITE). This display supports keyboard and trackball functions for the ARTS II, ARTS IIE, and ARTS IIIE. A radar gateway function will be incorporated to provide a primary and secondary radar data path to the R-ACD in the event of failure of both the ARTS II and ARTS IIIA processing systems.

Satellite Communication Airborne Radios

The Satellite Communication (SATCOM) airborne radios are transceivers installed in commercial, cargo, and military aircraft transiting in the National Airspace System (NAS) and are used as an alternate means of voice communications between pilots in aircraft and ground controllers. These transceivers are typically used in transoceanic applications.

Satellite Communication Ground Radios

Satellite Communications (SATCOM) Ground Radios are transceivers installed at oceanic and en route facilities to support an alternative means of tactical air traffic control (ATC) voice communications between ground controllers and pilots in aircraft. These transceivers are typically used in transoceanic applications. These transceivers are also installed at regional facilities and used as an alternate means of communications in case of total ground communications failure or between locations in mountainous terrain or where other means of communications are not possible (e.g., Alaska).

Oceanic air to ground satellite communications are provided via a communications service provider. The FAA currently has no plans to develop or implement its own air to ground SATCOM ground radios.

Small Tower Voice Switch (key system)

The Small Tower Voice Switch (STVS) is installed in small Airport Traffic Control Towers (ATCT) and in Flight Service Stations (FSS). The basic STVS has four operator positions. The STVS provides the Air Traffic Control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and Air Route Traffic Control Center (ARTCC) controllers/ Terminal Radar Approach Control (TRACON) controllers/FSS specialists/air traffic control system command center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the STVS. The STVS (installed in the FSS) provides the ATC operational G/G voice communications interconnectivity between specialists within an FSS (intercom), interconnectivity between specialists in separate FSSs (interphone), and interconnectivity between FSS specialists and Air Route Traffic Control

Center (ARTCC) controllers/Terminal Radar Approach Control (TRACON) controllers/ATCT controllers/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground radio connectivity between FSS specialists and pilots is also supported by the STVS.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate STVS systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Standard Terminal Automation Replacement System (key system)

The Standard Terminal Automation Replacement System (STARS) processes primary and secondary radar information to acquire and track data points to display aircraft position for controllers. STARS provides safety tools such as, conflict alert (CA), Mode C intruder (MCI), final monitoring aid (FMA), Minimum Safe Altitude Warning (MSAW), Converging Runway Display Aid (CARDA), and Controller Automated Spacing Aid (CASA). Also, STARS provides the capability to implement the following enhancements: improved radar processing, Global Positioning System (GPS) compatibility, adaptive routing, Center Terminal Radar Approach Control (TRACON) Automation System (CTAS), data link implementation, improved weather display, and better utilization of traffic management information.

Standard Terminal Automation Replacement System Early Display Configuration

The Standard Terminal Automation Replacement System, Early Display Configuration (STARS EDC) provides STARS workstations at a limited number of ARTS IIIA facilities to replace aging DEDS and provide validation of the STARS workstation design before the complete STARS is implemented. STARS EDC will include updates to ARTS software for life cycle maintenance, additional human-machine interface (HMI) requirements for both tower and Terminal Radar Approach Control (TRACON), and Automated Radar Terminal System Model IIIE (ARTS IIIE) human factors validation.

Surveillance Processor (Safe Flight 21)

The Surveillance Processor (Safe Flight 21) is a demonstration system that receives, processes, and distributes surveillance data between Safe Flight 21 (SF-21) architectural elements to support operational trials. The processor receives surveillance data from various sources, including surveillance sensors, Automatic Dependent Surveillance-Broadcast (ADS-B) systems, multilateration systems, Air Traffic Control (ATC) automation systems, and flight plan processing systems. The processor fuses the various surveillance data to create aircraft track data, which is distributed to various SF-21 architectural elements. One of the capabilities supported by the processor is the processing and distribution of Traffic Information Services - Broadcast (TIS-B) information to ADS (SF-21) Ground Stations, for subsequent transmission to aircraft.

Traffic Alert and Collision Avoidance System (key system)

A Traffic Alert and Collision Avoidance System (TCAS) broadcasts interrogations and receives responses from Air Traffic Control Radar Beacon System (ATCRBS) Mode A/C and Mode Select (Mode S) transponders within range. TCAS processes these responses to provide warnings, advisories and visual proximity information to the flight crew via a cockpit display.

Ultra High Frequency Airborne Radios (key system)

The Ultra High Frequency Avionics (UHF Avionics) are analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225-400 MHz frequency band, which are multi-channel transceivers, installed in an airborne military platform. These airborne devices support the tactical two-way voice communications/ coordination between the military pilot in the military aircraft and the controller on the ground.

Ultra High Frequency Ground Radios (key system)

Ultra High Frequency (UHF) Ground Radios are analog UHF amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 Mhz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and flight service station domains.

Ultra High Frequency Ground Radios - Replacement (key system)

The Ultra High Frequency Ground Radios - Replacement (UHF Ground Radios - Repl) mechanism represents analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 MHz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and Flight Service Station domains.

Very High Frequency / Ultra High Frequency Emergency Communications Transceivers - Terminal (key system)

Very High Frequency / Ultra High Frequency Emergency Communications Transceivers - Terminal (VHF/UHF ECT - Terminal) are analog VHF and UHF transceivers operating in either the 118 - 137 Mhz or 225 - 400 Mhz frequency bands. These transceivers are used in the terminal domain as emergency communications.

Very High Frequency Airborne Radios (key system)

Very High Frequency (VHF) Airborne Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 Mhz frequency band which are multi-channel transceivers installed in an airborne platform (e.g., commercial, cargo, and general aviation aircraft). These airborne devices support the tactical two-way voice communications/coordination between the pilot in the aircraft and the controller on the ground.

Very High Frequency Ground Radios (key system)

Very High Frequency (VHF) Ground Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 MHz frequency band which are single-channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the pilot in commercial, cargo, or general aviation aircraft in the oceanic, en route (i.e., ARTCC), terminal (i.e., TRACON/tower), and flight service station domains. Additionally, there are analog VHF frequency modulation (VHF - FM) radio devices operating in the 161 - 174 MHz frequency band that are multi-channel transceivers. These transceivers are used by flight inspection, aviation security, and airway facility specialists supporting local airport operations and maintenance or to perform their operational maintenance mission in support of the NAS. However, these same VHF-FM transceivers are also used to support the resolution of emergency situations or establish a level of voice command and control communications/coordination during disaster recovery.

Very High Frequency Multi-Mode Airborne Radios (key system)

Very High Frequency Multi-Mode Airborne Radios (VHF MM Airborne Radios) refers to an airborne radio operating in the very high frequency (VHF) range capable of operating in the following modes: (1)) analog voice (i.e., 25 kHz spacing for use in the United States and other similarly equipped countries); (2) VHF Digital Link Mode 2 (VDL Mode-2) (two-way digital data transmission); (3) VHF Digital Link Mode 3 (VDL Mode-3), (integrated two-way digital voice/data transmission); and (4) analog voice (i.e., 8.33 kHz spacing for use in Europe and other similarly equipped countries).

Voice Switching and Control System (key system)

The Voice Switching and Control System (VSCS) is installed in the Air Route Traffic Control Center (ARTCC). The VSCS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The VSCS provides the Air Traffic Control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ARTCC (intercom), interconnectivity between controllers in separate ARTCCs (interphone), and interconnectivity between ARTCC controllers and Terminal Radar Approach Control (TRACON) controllers/Airport Traffic Control Tower (ATCT) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ARTCC controllers and pilots is also supported by the VSCS.

Voice Switching and Control System Training and Backup Switches

Voice Switching and Control System Training and Backup Switch (VTABS) was developed to meet AT requirements for a separate standalone VSCS Backup and Training System. VTABS can be configured as a 50-position switch with the capability to support air traffic operations in the event of VSCS failure, hardware and software maintenance or power loss.

Western Electric Company Model 301 Voice Switch

The Western Electric Company Model 301 Voice Switch (WECO 301) supports air-to-ground communications between air traffic controllers and pilots and ground-to-ground communications among air traffic control (ATC) personnel.

People

Flight Service Specialist

A Flight Service Specialist performs the following activities:

* Provide services to aircraft in flight and during the pre-flight phase,

* Monitoring and restoration of NAVAID; Issuing local airport advisories,

* Relaying ATC clearances, advisories or requests,

* Issuing military flight advisory messages,

* Receiving and issuing NOTAMS,

* Assisting is search and rescue communication searches,

* Activating and closing flight plans,

* Making unscheduled broadcasts,

* Soliciting and issuing PIREPS,

* Presenting pilot weather briefings to airborne aircraft,

* Locating lost aircraft,

* Recording aircraft contacts,

* Providing weather advisories and flight plan services,

* Providing hazardous area reporting services, and

* Keeping airmen and weather information current.

Ground Controller

A Ground Controller performs the following activities: Ensure separation; Control vehicles as well as aircraft on movement areas other than active runways Initiate control instructions; Monitor and operate communications equipment; Utilize tower radar display(s); Utilize alphanumerics; Assist the tower associate controller with coordination; Scan tower cab environment; Ensure computer entries and strip marking are completed for instructions or clearances issued or received; Process and forward flight plan information; Perform any functions of the tower team which will assist in meeting situation objectives; Coordinate with local control for safe and efficient use of runways and movement areas.

Local Controller

A Local Controller performs the following activities: Ensure separation; Control active runways; Initiate control instructions; Monitor and operate communications equipment; Utilize tower radar display(s); Utilize alphanumerics; Assist the tower associate controller with coordination; Scan tower cab environment; Ensure computer entries and strip marking are completed for instructions or clearances issued or received; Process and forward flight plan information; Perform any functions of the tower team which will assist in meeting situation objectives; Coordinate with ground control for safe and efficient use of runways and movement areas.

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Radar Controller

A Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate automated handoffs; Assist the radar associate controller with non-automated handoff actions when needed; Assist the radar associate controller in coordination when needed; Scan radar display; Correlate with flight progress strip information; Ensure computer entries are completed on instructions or clearances you issue or receive; Ensure strip marking is completed on instructions or clearances you issue or receive.

Interfaces

Air Route Surveillance Radar - Model 1E — (Surveillance Data) → Air Traffic Control Beacon Interrogator - Model 6

The ATCBI-6 correlates return signals from the primary radar with beacon signals and transmits the data to the automation system.

Air Route Surveillance Radar - Model 1E — (Surveillance Data) → Peripheral Adapter Module Replacement Item

The ARSR-1 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the PAMRI interface, which then routes the data to the HCS and DARC for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 1E — (Weather Data) → Peripheral Adapter Module Replacement Item

The ARSR-1E long-range radar provides detected weather data to the PAMRI for processing at en route facilities.

Air Route Surveillance Radar - Model 2 — (Surveillance Data) → Air Traffic Control Beacon Interrogator - Model 6

The ATCBI-6 correlates return signals from the primary radar with beacon signals and transmits the data to the automation system.

Air Route Surveillance Radar - Model 2 — (Surveillance Data) → Peripheral Adapter Module Replacement Item

The ARSR-2 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the PAMRI interface, which then routes the data to the HCS and DARC for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 2 — (Weather Data) → Peripheral Adapter Module Replacement Item

The ARSR-2 long-range radar provides detected weather data to the PAMRI for processing at en route facilities.

Air Route Surveillance Radar - Model 3 — (Surveillance Data) → Air Traffic Control Beacon Interrogator - Model 6

The ATCBI-6 correlates return signals from the primary radar with the beacon signals and transmits the data to the automation system for tracking and display.

Air Route Surveillance Radar - Model 3 — (Surveillance Data) → Microprocessor-En Route Automated Radar Tracking System

The ARSR-3 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the Micro-EARTS for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 3 — (Surveillance Data) → Peripheral Adapter Module Replacement Item

The ARSR-3 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the PAMRI interface, which then routes the data to the HCS and DARC for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 3 — (Weather Data) → Peripheral Adapter Module Replacement Item

The ARSR-3 long-range radar provides detected weather data to the PAMRI for processing at en route facilities.

Air Route Surveillance Radar - Model 4 — (Surveillance Data) → Air Traffic Control Beacon Interrogator - Model 6

The ATCBI-6 correlates return signals from the primary radar with the beacon signals and transmits the data to the automation system for tracking and display.

Air Route Surveillance Radar - Model 4 — (Surveillance Data) → Automated Radar Terminal System - Model IIE

The ARSR-4 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.

Air Route Surveillance Radar - Model 4 — (Weather Data) → Automated Radar Terminal System - Model IIE

The ARSR-4 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIE for processing and use in controlling air traffic in the CERAP domain (Guam).

Air Route Surveillance Radar - Model 4 — (Surveillance Data) → Microprocessor-En Route Automated Radar Tracking System

The ARSR-4 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the Micro-EARTS for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 4 — (Weather Data) → Microprocessor-En Route Automated Radar Tracking System

The ARSR-4 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the Micro-EARTS for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 4 — (Surveillance Data) → Peripheral Adapter Module Replacement Item

The ARSR-4 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the PAMRI interface, which then routes the data to the HCS and DARC for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 4 — (Weather Data) → Peripheral Adapter Module Replacement Item

The ARSR-4 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the PAMRI for processing and use in controlling air traffic in the en route domain.

Air Traffic Control Beacon Interrogator - Model 4 — (Surveillance Data) → Air Route Surveillance Radar - Model 1E

The ARSR-1 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports via a CD-2, which sends the data to an automation system for tracking and display.

Air Traffic Control Beacon Interrogator - Model 4 — (Surveillance Data) → Air Route Surveillance Radar - Model 2

The ARSR-2 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports via a CD-2, which sends the data to an automation system for tracking and display.

Air Traffic Control Beacon Interrogator - Model 4 — (Surveillance Data) → Airport Surveillance Radar - Model 9

The ASR-9 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports and then sends the data to an automation system for tracking and display.

Air Traffic Control Beacon Interrogator - Model 4 — (Surveillance Data) → Automated Radar Terminal System - Model IIE

The ATCBI-4 sends aircraft identification, position, and altitude to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.

Air Traffic Control Beacon Interrogator - Model 4 — (Surveillance Data) → Automated Radar Terminal System - Model IIIE

The ATCBI-4 sends aircraft identification, position, and altitude to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.

Air Traffic Control Beacon Interrogator - Model 4 — (Surveillance Data) ➔ Microprocessor-En Route Automated Radar Tracking System
The ATCBI-4 sends aircraft identification, position, and altitude to the Micro-EARTS for processing and use in controlling air traffic in the terminal domain from a CERAP.
Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) ➔ Air Route Surveillance Radar - Model 1E
The ARSR-1 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports via a CD-2, which sends the data to an automation system for tracking and display.
Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) ➔ Air Route Surveillance Radar - Model 2
The ARSR-2 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports via a CD-2, which sends the data to an automation system for tracking and display.
Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) ➔ Air Route Surveillance Radar - Model 3
The ARSR-3 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports and then sends the data to an automation system for tracking and display.
Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) ➔ Air Route Surveillance Radar - Model 4
The ARSR-4 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports and then sends the data to an automation system for tracking and display.
Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) ➔ Airport Surveillance Radar - Model 9
The ASR-9 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports and then sends the data to an automation system for tracking and display.
Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIE
The ATCBI-5 sends aircraft identification, position, and altitude to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.
Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIA
The ATCBI-5 sends aircraft identification, position, and altitude to the ARTS IIIA for processing and use in controlling air traffic in the terminal domain.
Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIE
The ATCBI-5 sends aircraft identification, position, and altitude to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.
Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) ➔ Microprocessor-En Route Automated Radar Tracking System
The ATCBI-4 sends aircraft identification, position, and altitude to the Micro-EARTS for processing and use in controlling air traffic in the en route domain, as well as in terminal domains associated with CERAPs.
Air Traffic Control Beacon Interrogator - Model 6 — (Surveillance Data) ➔ Peripheral Adapter Module Replacement Item
The ATCBI-6 sends aircraft identification, position, and altitude to the PAMRI, which then routes to the HCS or DARC for processing and use in controlling air traffic in the en route domain.
Airport Surveillance Radar - Model 11 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIE
The ASR-11 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 11 — (Weather Data) ➔ Automated Radar Terminal System - Model IIE
The ASR terminal radar provides detected weather data to the ARTS for processing.
Airport Surveillance Radar - Model 11 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIE
The ASR-11 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 11 — (Weather Data) ➔ Automated Radar Terminal System - Model IIIE
The ASR primary radar provides detected weather data to the ARTS for processing.
Airport Surveillance Radar - Model 11 — (Surveillance Data) ➔ Microprocessor-En Route Automated Radar Tracking System
The ASR-11 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the automation equipment interface, which then routes the data to the Micro EARTS for processing and use in controlling air traffic in the en route domain.
Airport Surveillance Radar - Model 11 — (Surveillance Data) ➔ Standard Terminal Automation Replacement System
The ASR-11 ground radar provides aircraft positional data (azimuth and slant range) to STARS for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 11 — (Weather Data) ➔ Standard Terminal Automation Replacement System
The ASR-11 provides weather radar data to the STARS application interface gateway for display on its TCW and TDW displays. The radar and local controller uses these data to indicate the precipitation levels present within the TRACON and airport.
Airport Surveillance Radar - Model 7 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIE
The ASR-7 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 7 — (Weather Data) ➔ Automated Radar Terminal System - Model IIE
The ASR-7 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 7 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIE
The ASR-7 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 7 — (Weather Data) ➔ Automated Radar Terminal System - Model IIIE
The ASR-7 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 7 — (Surveillance Data) ➔ Microprocessor-En Route Automated Radar Tracking System
The ASR-7 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the Micro-EARTS for processing and use in controlling air traffic in the terminal domain from a CERAP.
Airport Surveillance Radar - Model 8 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIE
The ASR-8 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 8 — (Weather Data) ➔ Automated Radar Terminal System - Model IIE
The ASR-8 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIE use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 8 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIA
The ASR-8 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIA for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 8 — (Weather Data) ➔ Automated Radar Terminal System - Model IIIA
The ASR-8 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIIA for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 8 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIE
The ASR-8 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 8 — (Weather Data) ➔ Automated Radar Terminal System - Model IIIE
The ASR-8 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 8 — (Surveillance Data) ➔ Microprocessor-En Route Automated Radar Tracking System
The ASR-8 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the Micro-EARTS for processing and use in controlling air traffic in the terminal domain from a CERAP.
Airport Surveillance Radar - Model 8 — (Surveillance Data) ➔ Peripheral Adapter Module Replacement Item
The ASR-8 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the PAMRI for processing and use in controlling air traffic in the terminal domain from an ARTCC (for terminals with no TRACON).
Airport Surveillance Radar - Model 9 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIE
The ASR-9 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 9 — (Weather Data) ➔ Automated Radar Terminal System - Model IIE
The ASR terminal radar provides detected weather data to the ARTS for processing.
Airport Surveillance Radar - Model 9 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIA
The ASR-9 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIA for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 9 — (Weather Data) ➔ Automated Radar Terminal System - Model IIIA
The ASR terminal radar provides detected weather data to the ARTS for processing.
Airport Surveillance Radar - Model 9 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIE
The ASR-9 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 9 — (Weather Data) ➔ Automated Radar Terminal System - Model IIIE
The ASR primary radar provides detected weather data to the ARTS for processing.
Airport Surveillance Radar - Model 9 — (Surveillance Data) ➔ Standard Terminal Automation Replacement System
The ASR-9 ground radar provides aircraft positional data (azimuth and slant range) to STARS for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 9 — (Weather Data) ➔ Standard Terminal Automation Replacement System
The ASR-9 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the STARS for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar - Model 9 and Mode Select (Service Life Extension Program) — (Surveillance Data) ➔ Standard Terminal Automation Replacement System
The ASR-9 ground radar provides aircraft positional (azimuth and slant range) as well as time tag, identification, and intent data in ASTERIX format to STARS for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar, Military — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIE
The GPN-20 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar, Military — (Weather Data) ➔ Automated Radar Terminal System - Model IIE
The GPN-20 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIE use in controlling air traffic in the terminal domain.
Airport Surveillance Radar, Military — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIA
The GPN-20 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIA for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar, Military — (Weather Data) ➔ Automated Radar Terminal System - Model IIIA
The GPN-20 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIIA use in controlling air traffic in the terminal domain.
Airport Surveillance Radar, Military — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIE
The GPN-20 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.
Airport Surveillance Radar, Military — (Weather Data) ➔ Automated Radar Terminal System - Model IIIE
The GPN-20 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIIE use in controlling air traffic in the terminal domain.
Airport Surveillance Radar, Military — (Surveillance Data) ➔ Peripheral Adapter Module Replacement Item
The GPN-20 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the PAMRI for processing and use in controlling air traffic in the terminal domain from an ARTCC (for terminals with no TRACON).
Automated Radar Terminal System - Model IIE — (Flight Data) ➔ Automated Radar Terminal System Color Display
The ACD displays ARTS flight data to the controller.
Automated Radar Terminal System - Model IIE — (Track Data) ➔ Automated Radar Terminal System Color Display
The ARTS sends track data to the ACD for controller use.
Automated Radar Terminal System - Model IIE ← (Track Data) ➔ Peripheral Adapter Module Replacement Item
The ARTS IIE provides terminal surveillance data to ARTCC's via PAMRI.
Automated Radar Terminal System - Model IIE — (Track Data) ➔ Radar Automated Display System
The ARTS associates surveillance data from the ASR with flight data and provides track data to the controller workstation

RADS for display.

Automated Radar Terminal System - Model IIIA — (Flight Data) → Automated Radar Terminal System Color Display
The ACD displays ARTS flight data to the controller.
Automated Radar Terminal System - Model IIIA — (Track Data) → Automated Radar Terminal System Color Display
The ARTS sends track data to the ACD for controller use.
Automated Radar Terminal System - Model IIIA — (Track Data) → Full Digital Automated Radar Terminal System Display
Track data are exchanged between ARTS IIIA and the controller using FDAD.
Automated Radar Terminal System - Model IIIA — (Flight Data) → Host Computer System
The ARTS IIIA provides flight data to HCS via PAMRI.
Automated Radar Terminal System - Model IIIA — (Track Data) → Host Computer System
The ARTS IIIA provides surveillance data to HCS via PAMRI.
Automated Radar Terminal System - Model IIIA ← (Track Data) → Peripheral Adapter Module Replacement Item
The ARTS IIIA provides surveillance data to ARTCC's via PAMRI.
Automated Radar Terminal System - Model IIIE — (Flight Data) → Automated Radar Terminal System Color Display
The ACD displays ARTS flight data to the controller.
Automated Radar Terminal System - Model IIIE — (Track Data) → Automated Radar Terminal System Color Display
The ARTS sends track data to the ACD for controller use.
Automated Radar Terminal System - Model IIIE — (Track Data) → Full Digital Automated Radar Terminal System Display
Track data are exchanged between ARTS IIIE and the controller using FDAD.
Automated Radar Terminal System - Model IIIE — (Flight Data) → Host Computer System
The ARTS IIIE provides flight data to HCS via PAMRI.
Automated Radar Terminal System - Model IIIE — (Track Data) → Host Computer System
The ARTS IIIE provides surveillance data to HCS via PAMRI.
Automated Radar Terminal System - Model IIIE ← (Track Data) → Peripheral Adapter Module Replacement Item
The ARTS IIIE provides surveillance data to ARTCC's via PAMRI.
Enhanced Terminal Voice Switch — (Voice Communication) → Digital Voice Recorder System
This interface records and temporarily archives voice transmissions.
Enhanced Terminal Voice Switch ← (Voice Communication) → Enhanced Terminal Voice Switch
This interface enables ATC voice communication between controllers in same or different facilities.
Enhanced Terminal Voice Switch ← (Voice Communication) → Integrated Communications Switching System Type I
This interface enables ATC voice communication between controllers in different facilities.
Enhanced Terminal Voice Switch ← (Voice Communication) → Integrated Communications Switching System Type II
This interface enables ATC voice communication between controllers in different facilities.
Enhanced Terminal Voice Switch ← (Voice Communication) → Integrated Communications Switching System Type III
This interface enables ATC voice communication between controllers in different facilities.
Enhanced Terminal Voice Switch ← (Voice Communication) → Multi-Mode Digital Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Enhanced Terminal Voice Switch ← (Voice Communication) → Rapid Deployment Voice Switch Type I
This interface enables ATC voice communication between controllers in different facilities.
Enhanced Terminal Voice Switch ← (Voice Communication) → Rapid Deployment Voice Switch Type II
This interface enables ATC voice communication between controllers in different facilities.
Enhanced Terminal Voice Switch ← (Voice Communication) → Rapid Deployment Voice Switch Type IIA
This interface enables ATC voice communication between controllers in different facilities.
Enhanced Terminal Voice Switch ← (Voice Communication) → Small Tower Voice Switch
This interface enables ATC voice communication between controllers in different facilities.
Enhanced Terminal Voice Switch ← (Voice Communication) → Ultra High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Enhanced Terminal Voice Switch ← (Voice Communication) → Ultra High Frequency Ground Radios - Replacement
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Enhanced Terminal Voice Switch ← (Voice Communication) → Very High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Enhanced Terminal Voice Switch ← (Voice Communication) → Voice Switching and Control System
This interface enables ATC voice communication between controllers in different facilities.
Flight Data Input/Output ← (Flight Data) → Flight Data Input/Output
The FDIOs in ARTCCs, TRACONs, ATCTs, and two Oceanic centers (New York and Oakland) exchange flight data with FDIOs in other ARTCCs, FDIOs TRACONs, ATCTs, and two Oceanic Centers (New York and Oakland).
Flight Data Input/Output ← (Flight Data) → Peripheral Adapter Module Replacement Item
The FDIO systems communicate flight data to PAMRI.
Host Computer System ← (Flight Data) → Display System Replacement
The HCS sends flight data, time data, traffic management advisories to the DSR display and sends flight plans to the Flight Strip Printer. HCS receives flight plan amendments from ATC via entries on the R-position DSR.
Host Computer System ← (Track Data) → Display System Replacement
The HCS sends target fixes and track data to DSR and receives re-assignment of surveillance to sectors from ATCs as needed. (Note: the type of data passed to DSR is not raw surveillance data but rather is Target (fixes) and track (series of fixes) data produced by the HCS RDP.
Host Computer System — (Weather Data) → Display System Replacement
The HCS sends alphanumeric weather data to the DSR. Note: This is different from weather graphics, which is displayed on the DSR D-position from WARP.
Integrated Communications Switching System Type I — (Voice Communication) → Digital Voice Recorder System
This interface records and temporarily archives voice transmissions.
Integrated Communications Switching System Type I ← (Voice Communication) → Integrated Communications Switching System Type I
This interface enables ATC voice communication between controllers in same or different facilities.
Integrated Communications Switching System Type I ← (Voice Communication) → Integrated Communications Switching System Type II

This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type I ← (Voice Communication) → Integrated Communications Switching System Type III
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type I ← (Voice Communication) → Multi-Mode Digital Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Integrated Communications Switching System Type I ← (Voice Communication) → Rapid Deployment Voice Switch Type I
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type I ← (Voice Communication) → Rapid Deployment Voice Switch Type II
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type I ← (Voice Communication) → Rapid Deployment Voice Switch Type IIA
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type I ← (Voice Communication) → Small Tower Voice Switch
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type I ← (Voice Communication) → Ultra High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Integrated Communications Switching System Type I ← (Voice Communication) → Ultra High Frequency Ground Radios - Replacement
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Integrated Communications Switching System Type I ← (Voice Communication) → Very High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Integrated Communications Switching System Type I ← (Voice Communication) → Voice Switching and Control System
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type II — (Voice Communication) → Digital Voice Recorder System
This interface records and temporarily archives voice transmissions.
Integrated Communications Switching System Type II ← (Voice Communication) → Integrated Communications Switching System Type II
This interface enables ATC voice communication between controllers in same or different facilities.
Integrated Communications Switching System Type II ← (Voice Communication) → Integrated Communications Switching System Type III
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type II ← (Voice Communication) → Multi-Mode Digital Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Integrated Communications Switching System Type II ← (Voice Communication) → Rapid Deployment Voice Switch Type I
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type II ← (Voice Communication) → Rapid Deployment Voice Switch Type II
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type II ← (Voice Communication) → Rapid Deployment Voice Switch Type IIA
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type II ← (Voice Communication) → Small Tower Voice Switch
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type II ← (Voice Communication) → Ultra High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Integrated Communications Switching System Type II ← (Voice Communication) → Ultra High Frequency Ground Radios - Replacement
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Integrated Communications Switching System Type II ← (Voice Communication) → Very High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Integrated Communications Switching System Type II ← (Voice Communication) → Voice Switching and Control System
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type III — (Voice Communication) → Digital Voice Recorder System
This interface records and temporarily archives voice transmissions.
Integrated Communications Switching System Type III ← (Voice Communication) → Integrated Communications Switching System Type III
This interface enables ATC voice communication between controllers in same or different facilities.
Integrated Communications Switching System Type III ← (Voice Communication) → Multi-Mode Digital Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Integrated Communications Switching System Type III ← (Voice Communication) → Rapid Deployment Voice Switch Type I
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type III ← (Voice Communication) → Rapid Deployment Voice Switch Type II
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type III ← (Voice Communication) → Rapid Deployment Voice Switch Type IIA
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type III ← (Voice Communication) → Small Tower Voice Switch
This interface enables ATC voice communication between controllers in different facilities.
Integrated Communications Switching System Type III ← (Voice Communication) → Ultra High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Integrated Communications Switching System Type III ← (Voice Communication) → Ultra High Frequency Ground Radios - Replacement
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Integrated Communications Switching System Type III ← (Voice Communication) → Very High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Integrated Communications Switching System Type III ← (Voice Communication) → Voice Switching and Control System

This interface enables ATC voice communication between controllers in different facilities.

Mode 3/AC Transponder — (Surveillance Data) → Air Traffic Control Beacon Interrogator - Model 4

The ATCBI-4 interrogates and receives aircraft identification, position and altitude information from aircraft equipped with Air Traffic Control Radar Beacon System (ATCRBS) transponder.

Mode 3/AC Transponder — (Surveillance Data) → Air Traffic Control Beacon Interrogator - Model 5

The ATCBI-5 interrogates and receives aircraft identification, position and altitude information from aircraft equipped with Air Traffic Control Radar Beacon System (ATCRBS) transponder.

Mode 3/AC Transponder — (Surveillance Data) → Air Traffic Control Beacon Interrogator - Model 6

The ATCBI-6 interrogates and receives aircraft identification, position and altitude information from aircraft equipped with Air Traffic Control Radar Beacon System (ATCRBS) transponder.

Mode 3/AC Transponder — (Surveillance Data) → Airport Surveillance Radar - Model 11

The integrated secondary surveillance radar on the ASR-11 interrogates onboard transponders to acquire identification, postion, and altitude data from the aircraft.

Mode 3/AC Transponder — (Surveillance Data) → Traffic Alert and Collision Avoidance System

The TCAS broadcasts interrogations and receives responses from ATCRBS Mode A/C Transponder within range. It then processes the responses to provide proximity warning and conflict resolution instruction to the flight crew.

Mode Select Transponder — (Surveillance Data) → Air Traffic Control Beacon Interrogator - Model 4

The ATCBI-4 interrogates and receives aircraft identification, position and altitude information from aircraft equipped with the Mode S transponder.

Mode Select Transponder — (Surveillance Data) → Air Traffic Control Beacon Interrogator - Model 5

The ATCBI-5 interrogates and receives aircraft identification, position and altitude information from aircraft equipped with the Mode S transponder.

Mode Select Transponder — (Surveillance Data) → Air Traffic Control Beacon Interrogator - Model 6

The ATCBI-6 interrogates and receives aircraft identification, position and altitude information from aircraft equipped with the Mode S transponder.

Mode Select Transponder — (Surveillance Data) → Airport Surveillance Radar - Model 11

The integrated secondary surveillance radar on the ASR-11 interrogates onboard transponders to acquire identification, postion, and altitude data from the aircraft.

Mode Select Transponder — (Surveillance Data) → Traffic Alert and Collision Avoidance System

The TCAS broadcasts interrogations and receives responses from Mode S transponders within range. It then processes the responses to provide proximity warning and conflict resolution instruction to the flight crew.

Multi-Mode Digital Radios ← (Voice Communication) → Radio Control Equipment

Multi-Mode Digital Radios ← (Voice Communication) → Very High Frequency Airborne Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Multi-Mode Digital Radios ← (Voice Communication) → Very High Frequency Multi-Mode Airborne Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Peripheral Adapter Module Replacement Item — (Flight Data) → Host Computer System

The PAMRI is a conduit through which the HCS receives and exchanges flight data with remote FDIO flight strip printer system (printer/display/keyboard) as well as with external automation systems such as ARTS/STARS (TRACON), ODAPS/FDP2000 (Ocean), and FSM (ATCSCC). FDIO uses the General Purpose Input/Output (GPI/O) parallel interfaces and automation systems use the Interfacility Communications Input/Output (INTI/O) serial interfaces.

Peripheral Adapter Module Replacement Item — (Surveillance Data) → Host Computer System

The PAMRI passes surveillance data from the primary/secondary radars to the HCS for processing and use in controlling aircraft.

Peripheral Adapter Module Replacement Item — (Flight Data) → Peripheral Adapter Module Replacement Item

The PAMRI passes flight data between ARTCCs.

Peripheral Adapter Module Replacement Item — (Track Data) → Peripheral Adapter Module Replacement Item

The PAMRI passes track data between ARTCCs.

Radio Control Equipment ← (Voice Communication) → Enhanced Terminal Voice Switch

Radio Control Equipment ← (Voice Communication) → Integrated Communications Switching System Type I

Radio Control Equipment ← (Voice Communication) → Integrated Communications Switching System Type II

Radio Control Equipment ← (Voice Communication) → Integrated Communications Switching System Type III

Radio Control Equipment ← (Data Communication) → Radio Control Equipment

Radio Control Equipment ← (Voice Communication) → Rapid Deployment Voice Switch Type I

Radio Control Equipment ← (Voice Communication) → Rapid Deployment Voice Switch Type II

Radio Control Equipment ← (Voice Communication) → Rapid Deployment Voice Switch Type IIA

Radio Control Equipment ← (Voice Communication) → Small Tower Voice Switch

Radio Control Equipment ← (Voice Communication) → Voice Switching and Control System

Rapid Deployment Voice Switch Type I — (Voice Communication) → Digital Voice Recorder System

This interface records and temporarily archives voice transmissions.

Rapid Deployment Voice Switch Type I ← (Voice Communication) → Multi-Mode Digital Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Rapid Deployment Voice Switch Type I ← (Voice Communication) → Rapid Deployment Voice Switch Type I

This interface enables ATC voice communication between controllers in same or different facilities.

Rapid Deployment Voice Switch Type I ← (Voice Communication) → Rapid Deployment Voice Switch Type II

This interface enables ATC voice communication between controllers in different facilities.

Rapid Deployment Voice Switch Type I ← (Voice Communication) → Rapid Deployment Voice Switch Type IIA

This interface enables ATC voice communication between controllers in different facilities.

Rapid Deployment Voice Switch Type I ← (Voice Communication) → Small Tower Voice Switch

This interface enables ATC voice communication between controllers in different facilities.

Rapid Deployment Voice Switch Type I ← (Voice Communication) → Ultra High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Rapid Deployment Voice Switch Type I ← (Voice Communication) → Ultra High Frequency Ground Radios - Replacement

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Rapid Deployment Voice Switch Type I ← (Voice Communication) → Very High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Rapid Deployment Voice Switch Type I ← (Voice Communication) → Voice Switching and Control System
This interface enables ATC voice communication between controllers in different facilities.
Rapid Deployment Voice Switch Type II — (Voice Communication) → Digital Voice Recorder System
This interface records and temporarily archives voice transmissions.
Rapid Deployment Voice Switch Type II ← (Voice Communication) → Multi-Mode Digital Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Rapid Deployment Voice Switch Type II ← (Voice Communication) → Rapid Deployment Voice Switch Type II
This interface enables ATC voice communication between controllers in same or different facilities.
Rapid Deployment Voice Switch Type II ← (Voice Communication) → Rapid Deployment Voice Switch Type IIA
This interface enables ATC voice communication between controllers in different facilities.
Rapid Deployment Voice Switch Type II ← (Voice Communication) → Small Tower Voice Switch
This interface enables ATC voice communication between controllers in different facilities.
Rapid Deployment Voice Switch Type II ← (Voice Communication) → Ultra High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Rapid Deployment Voice Switch Type II ← (Voice Communication) → Ultra High Frequency Ground Radios - Replacement
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Rapid Deployment Voice Switch Type II ← (Voice Communication) → Very High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Rapid Deployment Voice Switch Type II ← (Voice Communication) → Voice Switching and Control System
This interface enables ATC voice communication between controllers in different facilities.
Rapid Deployment Voice Switch Type IIA — (Voice Communication) → Digital Voice Recorder System
This interface records and temporarily archives voice transmissions.
Rapid Deployment Voice Switch Type IIA ← (Voice Communication) → Multi-Mode Digital Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Rapid Deployment Voice Switch Type IIA ← (Voice Communication) → Rapid Deployment Voice Switch Type IIA
This interface enables ATC voice communication between controllers in same or different facilities.
Rapid Deployment Voice Switch Type IIA ← (Voice Communication) → Small Tower Voice Switch
This interface enables ATC voice communication between controllers in different facilities.
Rapid Deployment Voice Switch Type IIA ← (Voice Communication) → Ultra High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Rapid Deployment Voice Switch Type IIA ← (Voice Communication) → Ultra High Frequency Ground Radios - Replacement
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Rapid Deployment Voice Switch Type IIA ← (Voice Communication) → Very High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Rapid Deployment Voice Switch Type IIA ← (Voice Communication) → Voice Switching and Control System
This interface enables ATC voice communication between controllers in different facilities.
Small Tower Voice Switch — (Voice Communication) → Digital Voice Recorder System
This interface records and temporarily archives voice transmissions.
Small Tower Voice Switch ← (Voice Communication) → Multi-Mode Digital Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Small Tower Voice Switch ← (Voice Communication) → Small Tower Voice Switch
This interface enables ATC voice communication between controllers in same or different facilities.
Small Tower Voice Switch ← (Voice Communication) → Ultra High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Small Tower Voice Switch ← (Voice Communication) → Ultra High Frequency Ground Radios - Replacement
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Small Tower Voice Switch ← (Voice Communication) → Very High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Small Tower Voice Switch ← (Voice Communication) → Voice Switching and Control System
This interface enables ATC voice communication between controllers in different facilities.
Standard Terminal Automation Replacement System — (Flight Data) → Host Computer System
The STARS provides flight data to ARTCCs via HCS.
Standard Terminal Automation Replacement System — (Track Data) → Host Computer System
The STARS provides flight data to ARTCCs via HCS.
Standard Terminal Automation Replacement System — (Track Data) → Peripheral Adapter Module Replacement Item
Flight data, track data, test data, and responses are exchanged between terminal and en route and between terminal and adjacent terminal.
Ultra High Frequency Ground Radios ← (Voice Communication) → Ultra High Frequency Airborne Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Ultra High Frequency Ground Radios - Replacement ← (Voice Communication) → Ultra High Frequency Airborne Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Very High Frequency Ground Radios ← (Voice Communication) → Very High Frequency Airborne Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Very High Frequency Ground Radios ← (Voice Communication) → Very High Frequency Multi-Mode Airborne Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Voice Switching and Control System — (Voice Communication) → Digital Voice Recorder System
This interface records and temporarily archives voice transmissions.
Voice Switching and Control System ← (Voice Communication) → Multi-Mode Digital Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Voice Switching and Control System ← (Voice Communication) → Ultra High Frequency Ground Radios
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Voice Switching and Control System ← (Voice Communication) → Ultra High Frequency Ground Radios - Replacement
This interface enables voice communication between controllers and pilots providing ATC coordination and direction.
Voice Switching and Control System ← (Voice Communication) → Very High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Voice Switching and Control System ← (Voice Communication) → Voice Switching and Control System

This interface enables ATC voice communication between controllers in same or different facilities.

Issues

None

Service Group Air Traffic Services

Service Flight Planning

Capability Flight Data Management

Operational Improvement

Current Flight Data Management (101201)

All users (e.g., general aviation, commercial, military, Customs, law enforcement) submit flight plan data for processing. This includes validating flight plans; notifying users of any problems; and flight plan activation, processing amendments, cancellations, and flight plan closures. The NAS disseminates flight plan information as necessary.

01-Sep-2000 to 01-Dec-2007

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

The requirements for handling of the flight data is dependent on the type of the Flight Plan, (FP) initiating the data management of the flight. Flight Plans can be broken down into two types, those that do not require an ATC (Air Traffic Control) Clearance (VFR) and those that do require an ATC Clearance (IFR). Although FAA's Flight Plan form indicates three types of FPs, there are actually only two basic types; i.e. VFR and IFR. The third check in the FAA's FP form is for Defense Visual Flight Rules (DVFR). All other types of FPs are a combination or abbreviation of these two basic types. Flight Plans can be further categorized as Domestic, or International. Domestic FP procedures (FAA and Military) are used for flights in the Continental U.S. (CONUS), Canada, and the Honolulu, Alaskan, and San Juan domestic control areas. International, or ICAO, FPs are required if the flight takes the aircraft into any other nation's airspace, regardless of the type flight, except for transborder, over land, to/from Mexico and Canada. VFR FPs are for flights conducted under VMC (Visual Meteorological Conditions) as specified in the FARs and are commonly referred to as the rule of see and be seen. Each branch of the military and U.S. Coast Guard (USCG) requires VFR FPs per Department of Defense (DoD)/USCG regulations even though the FAA does not require them. The military have their own rules and regulations concerning the filing of FPs for their VFR flights.

DVFR FPs are for VFR flights that will cross our national borders or, more specifically, those that will enter, cross, or operate in the Contiguous U.S. (CONUS) Air Defense Identification Zone (ADIZ). IFR FPs are mandatory if any portion of the flight will be under Instrument Flight Rules because IFR flights require separation from other flights by ATC. Special VFR FPs are for short-range flights, within specific Classes of airspace, in lower weather conditions than those required for VFR flight. In fact, one could say they are quasi-IFR flights. SVFR flight requires an ATCl) clearance, but as the name implies, special VFR operating rules apply. IFR/VFR Composite Flight Plans are for flights that contain both VFR and IFR segments, (also referred to as legs). Just as for a normal VFR flight, the VFR portions of an IFR/VFR Composite flight do not require that a VFR FP be filed. If a FP is filed for the VFR leg(s), a separate FP for each leg is required and the pilot must activate and close the FP for each VFR leg of the flight with an AFSS/AIFSS.

There is one more FP that is not truly a Type of FP but needs to be discussed here. VFR OTP (VFR-On-Top, or, as they say internationally, Over-The-Top) is not truly a type of FP but, rather an altitude assignment for an IFR FP. However, for those that use it extensively, VFR OTP is synonymous with a type of flight and an altitude assignment of OTP carries with it more requirements than maintaining a hard altitude; i.e.: restrictions imposed after sunset, flight between cloud layers, etc., none of which are imposed for pure VFR or IFR flight. Further, when one advises an AFSS Specialist that they desire to file a VFR OTP FP, the Specialist knows immediately what is desired. Therefore, for the sake of covering all bases, and because flying VFR OTP is completely different than other types of FP, it will be discussed here as though it were genuinely a unique type.

The FARs does not require Air Carriers, Commuters or Air Taxis to file VFR FPs with the FAA. However, each company must file, and maintain, an Operations Manual at one of the FAAs Flight Standards Field Offices. If an Air Carrier's Operations Manual does not mandate the filing of a VFR flight plan with the FAA, the FAR requires the company to have Flight Locating Requirements for Commuter and Air Taxi certificate holders. Typically, the larger Air Carrier companies do not pass VFR FPs to the FAA since they perform their own flight watch duties and generally maintain direct radio contact with their aircraft throughout the flight. However, Commuters and Air Taxi certificate holders do tend to file VFR FPs with the FAA since their companies normally are not large enough to handle their own flight monitoring tasks.

VFR FPs can be entered into the NAS via the Model One Full Capacity, (M1FC),Aeronautical Information Service, (AIS), Flight Data Input/Output,(FDIO), or Automated Radar Terminal System, (ARTS), if the pilot is requesting Flight Following and Traffic Advisory Service. The FP will be forwarded to the appropriate controller at the appropriate time, just as in the case of an IFR FP. However, for an ARTS-entered VFR FP, the data that is forwarded facility-to-facility and controller-to-controller is limited in scope and content to that needed to determine direction of flight, destination, and type aircraft/equipment on board.

The Flight Service Data Processing System, (FSDPS), holds the VFR FP in storage until time for distribution, which is when the FP's P-Time is less than two hours from current time (i.e.: P-Time minus 1 hr, 59 min, 59 sec). The FP is then placed in the Proposed Departure List for the departure airport's tie-in AFSS and displayed on that AFSS's M1FC. When the VFR FP is activated by the pilot and the Specialist has transmitted a Departure message, the FSDPS moves the FP data to the Arrival List of the destination tie-in AFSS.

In addition to the normal VFR distribution and processing, for air defense purposes a DVFR FPs and inbound transborder flights from Mexico and Canada on Domestic VFR FPs must also be specifically routed to additional recipients. The recipients are the U. S. Military's Air Defense, the appropriate one of the three Automated International Flight Service Stations (AIFSS), and the specific Air Route Traffic Control Center (ARTCCs) in whose airspace the flight will enter. As appropriate, an informational copy of the FP will also be sent to the offices of Customs, Drug Enforcement, Agriculture, and Immigration.

Domestic IFR FP information is normally passed between ARTCCs from HCS to HCS via PAMRI (Peripheral Adapter Modules Replacement Item) and from ARTCCs to terminal via ARTS and FDIO. However, international flights are passed directly to foreign ACCs (Area Control Centers) via the National Airspace Data Interchange Network, (NADIN)/AFTN (Aeronautical Fixed Telecommunications Network). Also, for those domestic flights whose routing has 20 or more elements (10 in non-automated situations) outside the originating ARTCC's airspace, the flight plan and/or flight progress data is passed via NADIN-II to each of the subsequent ARTCCs that will work the aircraft.

When the routing will take the aircraft into or though a terminal's airspace, the HCS of the host ARTCC (ARTCC whose airspace overlies the terminal airspace) forwards the information to that terminal facility's ARTS and FDIO. For Tower Enroute flights (flights that will be worked by two or more successive terminal facilities), the Flight Plan and flight progress data is passed from ARTS to ARTS through the host ARTCC's HCS. If those terminal facilities lie on an ARTCC airspace boundary, the data passes from the ARTS to the host ARTCC's HCS to the host ARTCC of the other facility and then to the receiving terminal facility's ARTS. This is called Host/Non-Host processing.

A copy of all IFR FPs is sent to the ATCSCC (Air Traffic Control Systems Command Center) via NADIN-II for Traffic Management purposes. Once the Traffic Management restrictions are applied at the HCS level, as appropriate, the modified FP is distributed to the departure ATCT, TRACON, etc.

The distribution of ICAO FPs to the HCS is the same as for domestic FPs. However, immediately upon receipt (even if it's the day prior to departure), the FSDPS sends the ICAO FP to NADIN-II (which may send it to NADIN-I) for distribution to the appropriate foreign ATC facilities, called Area Control Centers (ACC). NADIN-II/I sends the FP via the AFTN, which is the ICAO supported data communications network for ATC. Both NADIN-I and NADIN-II networks include the AFTN messaging capability plus other capabilities such as weather, NOTAMs, etc.

The AFTN equipment at the ACCs that will receive the FP and follow-up messages determines whether the FP goes to NADIN-II or on to NADIN-I. Many, if not most, ACCs around the world still use message switching networks (MSN), or even old teletype systems, and, therefore, cannot communicate with the NADIN-II packet-switching network (PSN). If such is the case, NADIN-II sends the FP to NADIN-I for forwarding via AFTN. If the addressee(s) have PSN AFTN systems, NADIN-II will forward the FP.

Support for maintenance of the flight can also vary by flight plan type. Regardless of type, the pilot-in-command of the aircraft is responsible for keeping the FP information current including the revision of any parts of the FP. Pilots often delay their departure and sometimes extend or lengthen their time enroute due to the necessity of circumnavigating thunderstorms, making unanticipated landings due to strong headwinds requiring more fuel to reach their destinations. Regardless of whether the flight is VFR or IFR, the pilot-in-command is the person who must keep in mind the potential for delays, changes of route, change of destination, etc., that may lead to concern at the destination and even generate unnecessary Search & Rescue (SAR) efforts. All ATC/AFSS facilities can, and will, accept amendments, cancellations, and FP closures

IFR FPs, revisions, cancellations, etc., are passed from HCS to HCS and from HCS to various terminal facilities via the FDIO and the Automated Radar Terminal System (ARTS-IIE, ARTS-IIIA, ARTS-IIIE, Common ARTS (C-ARTS), and Micro Enroute ARTS (MEARTS)).The IFR FPs are retained in the NAS only for a short duration (normally two hours) following the P-Time. If the P-Time on the filed FP lapses beyond the HCS-programmed retention time for proposed departures, the FP will be discarded by the NAS.

The retention time for Proposed IFR FPs is variable by ARTCC and is sometimes shortened due to heavy traffic loads caused by special events such as the Super Bowl, Masters Golf Tournament, Indianapolis 500 Race, etc.

The time parameter for IFR FP retention is variable by ARTCC, but applies to all airports in that ARTCC's airspace; therefore, it could have the opposite effect on another high-density airport in the same ARTCC's jurisdiction. It's easy to see why the responsibility to update the P-Time for individual flights is placed on the pilot and why this parameter is changed only after serious consideration of the consequences.

Flight plan activation also varies by flight plan type. Federal Air Regulations hold the pilot responsible for activating his/her FP and, for VFR FPs, it should be done by the pilot contacting the AFSS on air/ground radio. However, sometimes, the pilot requests the ATCT Controller, AOC Dispatcher or a company representative to notify the AFSS of his/her departure time. A second party activating the FP is acceptable so long as the pilot initiates the action. No one should take it upon him/herself to do the pilot a favor by activating the FP for someone else without their knowledge. As discussed below, if the pilot doesn't know the FP was activated, he/she will not attempt to close it, which could result in Search and Rescue being activated.

IFR FPs are automatically activated when the ARTS sends a Departure Message (DM) to the HCS as soon as the system sees the target on the radar. In non-ARTS, non-radar and for non-discreet beacon code aircraft, the Controller must manually enter the DM in the FDIO or, if the ARTS is operating, the ARTS. .

By FAR the pilot-in-command of the aircraft is held accountable for opening (activating) and closing (or canceling) an active FP. The pilot-in-command is responsible for ensuring the P-Time is updated as required, canceling the FP if he/she elects not to use the FP and, most importantly, to close the FP upon arrival at the destination or point designated in the FP as the cancellation point.

If the pilot or other authorized person activated the VFR FP, the FAA Specialists/Controllers must ensure that the aircraft has landed and the FP has been closed before it can be forgotten. Otherwise, the Search and Rescue (SAR) procedures must be activated. Pilots flying IFR must ensure their FPs are closed with the ATC facility responsible for their separation. This will be done automatically at a controlled airport, but at and uncontrolled airport (in Class G) airspace, the pilot must notify the controlling facility that he/she has landed and the FP should be closed. . When a military cross-country flight land, the ATCT (military or civil) Controller notifies the AFSSD at the tie-in AFSS, of the down time and he/she closes the flight notification message.

Benefits

Current operations are provided in the NAS.

Systems

Aeronautical Information System Replacement (key system)

The Aeronautical Information System (AISR) is a web based replacement system for the obsolete, maintenance intensive, non-Year 2000 (Y2K) compliant Leased A and B service (LABS) GS-200 system. AISR provides a workstation to: (a) process flight plans (file, amend, cancel, store and transmit) including ICAO flight plans, (b) retrieve aeronautical weather from WMSCR, collectives and AIS, and (c) process Notice to Airmen (NOTAM) (collect and distribute). AIS uses FAA IP Routed Multi-user Net (FIRMNet) for access by 60+ flight data (FD) specialists in ARTCCs, 60+ in AFSSs, and 10+ in FAA Regional Offices (ROs). It uses Non-classified Internet Protocol Router Network (NIPRNet) for access by 60+ Military Base Operations (MBOs), dedicated lines for access by 20+ Meteorological Weather Processing Centers and National Airspace Data Interchange Network (NADIN) Packet-Switched Network (PSN) for access to the Weather Message Switching Center Replacement (WMSCR). Alternate access is available via toll free service to a local service provider. The primary AIS server is located in the National Network Control Center (NNCC) Salt Lake City facility and the back-up server is located in Chantilli VA.

Military base operations uses AIS for flight plan input.

Automated Radar Terminal System - Model IIE

The Automated Radar Terminal System - Model IIE (ARTS IIE) provides radar data processing (RDP) and decision support tools to the controller in the terminal environment. Utilized at low to medium-size Terminal Radar Control (TRACONs) Facilities the ARTS IIE is capable of receiving input from up to 2 sensors, can process up to 256 tracks simultaneously, and support up to 22 displays. The ARTS IIE implements the Common ARTS software for improved performance maintenance efficiency. The radar data processing (RDP) software provides automated surveillance tracking and display processing. Included in the ARTS IIE software are decision support tools such as Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Mode C intruder alert, Converging Runway Display Aid (CRDA), and Controller Automation Spacing Aid (CASA).

Automated Radar Terminal System - Model IIIA

The Automated Radar Terminal System - Model IIIA (ARTS IIIA) provides radar data processing (RDP) and decision support tools to the controller in the terminal environment. Utilized at larger airports, ARTS IIIA is capable of receiving input from up to three sensors, can process up to 900 tracks simultaneously and support up to 36 displays. The RDP software provides automated surveillance tracking and display processing. Included in the ARTS IIIA software are decision support tools such as Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Mode C intruder alert, Converging Runway Display Aid (CRDA), Final Monitor Aid (FMA), and controller automation spacing aid.

Automated Radar Terminal System - Model IIIE

The Automated Radar Terminal System - Model IIIE (ARTS IIIE) consists of the hardware platform and software required providing radar data processing (RDP) and decision support tools to the controller in the terminal environment. The ARTS IIIE is used at consolidated Terminal Radar Approach Control (TRACON) facilities. The Common ARTS program provided an ARTS IIIE capable of receiving input from up to 15 sensors, the ability to process up to 10,000 tracks simultaneously, and support up to 223 displays. The RDP software provides automated surveillance tracking and display processing including mosaic display of radar data. Included in the ARTS IIIE software are decision support tools such as Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Mode C intruder alert, Converging Runway Display Aid (CRDA), Final Monitor Aid (FMA), and controller automation spacing aid.

Direct User Access Terminal Service (key system)

Direct User Access Terminal Service (DUATS) is a vendor-provided service giving pilots convenient access to pre-flight aeronautical and weather information for flight planning. Allows pilots to input instrument flight rules (IFR), international civil aviation organization (ICAO), and visual flight rules (VFR) flight plans into the system.

En Route Communications Gateway

The En Route Communications Gateway (ECG) replaces PAMRI and provides a modernized LAN-based infrastructure capable of accommodating ERAM with minimal modifications. The PAMRI functions to be replaces include providing communications interfaces to external systems located in other ARTCCs, TRACONs, AFSSs, ATCSCC, NORAD, US Law Enforcement, US Customs, Military Base Operations, and international ACCs. Other interfaces include the FDIO Central Control Unit, which exchanges FDIO data with FAA and DOD facilities, and the NADIN Concentrator, which exchanges data through the NADIN PSN with the the M1FC via WMSCR. ECG increases the number of external interfaces to radars from 24 to 36. ECG provides internal interfaces between HCS and DARC (or EBUS) and between HCS and traffic flow processors such as ETMS and DSP. ECG includes a Monitor and Control subsystem and a display for monitoring up to two dozen radars--called the Random Access Plan Position Indicator (RAPPI).

The operational components of ECG consist of a front end processor (communications and surveillance interfaces), two gateway processors (internal connectivity to HCS and DARC/EBUS), and separate LANs that communicate between the front end and gateway processors on the primary channel and between the front end and gateway processors on the backup channel. The primary data path, consisting of the ECG primary gateway and the HCS, operate on separate hardware platforms. However, the backup data path, consisting of the ECG backup gateway and the EBUS, will operate on the same hardware platform--the ECG gateway platform. This processor, with both functions performed therein, is renamed to the Backup Interface Processor (BIP). In essence, a single processor operates on the backup channel, supporting both the ECG gateway function and the EBUS function. These two functions will remain, however, as two mechanisms in the NAS architecture.

Flight Data Input/Output

The Flight Data Input/Output (FDIO) system provides flight progress information for use by the Tower, Terminal Radar Approach Control (TRACON) and Air Route Traffic Control Center (ARTCC) controllers. The FDIO system allows Air Traffic Control (ATC) Specialists to input automated flight data, perform data manipulation, and print flight strips.

Flight Service Automation System Power Conditioning System

The Flight Service Automation System Power Conditioning System (FSAS Pwr Cond Sys) provides power-conditioning systems for Flight Service Station (FSS) facilities.

Flight Service Data Processing System (key system)

The Flight Service Data Processing System (FSDPS) provides a centralized database and processing capabilities to support the flight services performed by specialists in the associated Automated Flight Service Station (AFSS) facilities. The FSDPS database contains aeronautical information, weather information, and the required flight data to support the various flight service functions (e.g., route-oriented weather briefings and the flight-following function).

Host Computer System (key system)

The Host Computer System (HCS) receives and processes surveillance reports, and flight plan information. The HCS sends search/beacon target, track and flight data, surveillance and alphanumeric weather information, time data, traffic management advisories and lists to the (Display System Replacement) DSR. The HCS associates surveillance-derived tracking information with flight-planning information. The DSR sends requests for flight data, flight data updates, and track control messages to the HCS. HCS-generated display orders are translated for use within the DSR workstation. While radar data processing is distributed among the terminal and En Route computer resources, the HCS performs virtually all of the flight data processing for its entire geographical area of responsibility. Every tower (ATCT) and terminal radar approach control (TRACON) relies exclusively on its parent HCS for flight data.

The HCS also runs algorithms that perform aircraft to aircraft (conflict alert) and aircraft to terrain (Minimum Safe Altitude Warning) separation assurance. The HCS algorithms provide visual and audible alerting to the controller when conflicts are identified.

The HCS presently supplies real time surveillance, flight data and other information to several decision support tools housed in collocated outboard processors connected via two-way high bandwidth links to the HCS and DSR. These are the (User Request Evaluation Tool, (URET), and the Traffic Management Advisory (TMA. URET performs probing of tentative flight plan changes to determine their viability. TMA provides sequencing and spacing information to align the aircraft in En Route airspace for approach.

Model One Full Capacity (key system)

The Model One Full Capacity (M1FC) system, located at Automated Flight Service Stations (AFSS), interface with a Flight Service Data Processing System (FSDPS) at FAA Air Route Traffic Control Centers (ARTCC). The M1FC is an information processing system used by Flight Service Specialists to collect and distribute Notice to Airmen (NOTAM), weather information, and flight plan related data to General Aviation pilots. In addition, the system supports the timely initiation of search and rescue processing and the capability to reconstruct system events based on time, terminal, or aircraft information.

National Airspace Data Interchange Network Message Switch Network (key system)

The National Airspace Data Interchange Network Message Switch Network (NADIN MSN) (sometimes called NADIN 1A) is an integrated store-and-forward telecommunications system consisting of message-switched networks, accessed by remote concentrators. NADIN MSN provides flight plan, weather, and Notice to Airmen (NOTAM) information, and meets the International Civil Aviation Organization (ICAO) requirements for Aeronautical Fixed Telecommunications Network (AFTN) support.

National Airspace Data Interchange Network Packet Switch Network (key system)

The National Airspace Data Interchange Network Packet Switch Network (NADIN PSN) (sometimes called NADIN II) is an X.25 packet-switched network that augments and functions in parallel with the National Airspace Data Interchange Network Message-Switched Network (NADIN MSN). Collectively, both networks are known as NADIN. The NADIN PSN is a data communications network composed of packet-switching nodes connected by high-speed digital backbone trunks and controlled by the National Network Control Center (NNCC).

Oceanic Display and Planning System (key system)

The Oceanic Display and Planning System (ODAPS) consists of equipment that monitors and tracks aircraft over the ocean. It communicates and displays position data and flight plan information to the air traffic controllers responsible for monitoring and routing air traffic in the U.S. oceanic airspace. ODAPS has a situation display of aircraft position based on extrapolation of periodic voice position reports and filed flight plans. ODAPS includes a conflict probe (CP) functionality, which provides advance notification whenever stored flight plan information indicates that loss of separation minima may occur between aircraft, airspace reservations or warning areas.

Operational and Supportability Implementation System (key system)

Operational and Supportability Implementation System (OASIS): The capabilities provided by the OASIS include alphanumeric and graphic weather product acquisition and display, flight plan processing, search and rescue services, and law enforcement support. The OASIS provides a real-time, multi-user, computer-based system that provides current weather information, forecast weather information, Notice to Airmen (NOTAM) information, and flight planning.

OASIS also supports flight service specialists at International Automated Flight Service Stations (IAFSS) that provide services associated with aircraft transiting the oceans.

Peripheral Adapter Module Replacement Item (key system)

The Peripheral Adapter Module Replacement Item (PAMRI) is an interface peripheral to the HOCSR. It provides a conduit through which the HOCSR receives and exchanges data, primarily radar data, flight data and interfacility data. The PAMRI converts communication protocols and translates data formats so the Host and EDARC can communicate with external devices.

Power Systems

The Power Systems (Pwr Sys) mechanism provides for the conditioning of commercial power, including uninterruptible power systems (UPS), to eliminate voltage dropouts, surges, and voltage sags caused by sources outside the facility. Power distribution, grounding, bonding and shielding of electrical system within the facility is also part of the Pwr Sys.

The Power Systems (Pwr Sys) mechanism provides the following: 1.) ACEPS Busway Replacements, 2.) ACEPS EG Maintenance, 3.) ACEPS Monitoring & Diagnostics, 4.) ACEPS Fuel System Upgrade, 5.) ACEPS Training, 6.) Battery Monitoring, 7.) Training Facility, 8.) CPDS, 9.) Battery Replacements, 10.) DC Systems, 11.) EG, 12.) LPGBS, 13.) Power Cable, 14.) UPS, 15.) Contract Support.

People

Airline Operations Center Dispatcher

The Airline Operations Center Dispatcher (AOC Dispatcher) is a major airline employee that enters bulk flight plan requests and works with FAA by revising schedules and providing flight cancellations based on FAA provided data (aggregate demand lists, arrival rates, and parameters for anticipated ground delays.)

Clearance Delivery

A Clearance Delivery Controller performs the following activities: Operate communications equipment; process and forward flight plan information; issue clearances and ensure accuracy of pilot read back; assist tower cab in meeting situation objectives; operate tower equipment; utilize alphanumerics.

Flight Data Controller

A Flight Data Controller performs the following activities: Operate interphone; Assist Radar Associate Controller in managing flight progress strips; Receive/process and distribute flight progress strips; Ensure flight data processing equipment is operational; Request/receive and disseminate weather, NOTAM's, NAS status, traffic management, and Special Use Airspace status messages; Manually prepare flight progress strips when automation systems are not available; Enter flight data into computer; Forward flight data via computer; Assist facility/sector in meeting situation objectives.

Flight Service Specialist

A Flight Service Specialist performs the following activities:

* Provide services to aircraft in flight and during the pre-flight phase,

* Monitoring and restoration of NAVAID; Issuing local airport advisories,

* Relaying ATC clearances, advisories or requests,

* Issuing military flight advisory messages,

* Receiving and issuing NOTAMS,

* Assisting is search and rescue communication searches,

* Activating and closing flight plans,

* Making unscheduled broadcasts,

* Soliciting and issuing PIREPS,

* Presenting pilot weather briefings to airborne aircraft,

* Locating lost aircraft,

* Recording aircraft contacts,

* Providing weather advisories and flight plan services,

* Providing hazardous area reporting services, and

* Keeping airmen and weather information current.

Ground Controller

A Ground Controller performs the following activities: Ensure separation; Control vehicles as well as aircraft on movement areas other than active runways Initiate control instructions; Monitor and operate communications equipment; Utilize tower radar display(s); Utilize alphanumerics; Assist the tower associate controller with coordination; Scan tower cab environment; Ensure computer entries and strip marking are completed for instructions or clearances issued or received; Process and forward flight plan information; Perform any functions of the tower team which will assist in meeting situation objectives; Coordinate with local control for safe and efficient use of runways and movement areas.

Local Controller

A Local Controller performs the following activities: Ensure separation; Control active runways; Initiate control instructions; Monitor and operate communications equipment; Utilize tower radar display(s); Utilize alphanumerics; Assist the tower associate controller with coordination; Scan tower cab environment; Ensure computer entries and strip marking are completed for instructions or clearances issued or received; Process and forward flight plan information; Perform any functions of the tower team which will assist in meeting situation objectives; Coordinate with ground control for safe and efficient use of runways and movement areas.

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Preflight Position

A Preflight Position performs the following activities: Brief and translate to pilots current weather, NOTAMS, flow control restrictions; Apply VFR not recommended procedures.

Radar Associate Controller

A Radar Associate Controller performs the following activities: Ensure separation, initiate control instructions; operate interphones; Accept and initiate non-automated handoffs; and ensure radar controller is made aware of the actions; Assist the radar controller by accepting or initiating automated handoffs/pointouts which are necessary for the continued smooth operation of the sector, and ensure that the radar controller is made immediately aware of any action taken; Coordinate, including pointouts; Monitor radios when not performing higher priority duties; Scan flight progress strips; Correlate with radar data; Manage flight progress strips; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the radar controller when aware of those instructions.

Radar Controller

A Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate automated handoffs; Assist the radar associate controller with non-automated handoff actions when needed; Assist the radar associate controller in coordination when needed; Scan radar display; Correlate with flight progress strip information; Ensure computer entries are completed on instructions or clearances you issue or receive; Ensure strip marking is completed on instructions or clearances you issue or receive.

Traffic Management Specialist

Traffic Management Specialists perform the following activities: Balance air traffic demand with the airspace's capacity to maintain maximum and efficient utilization of the NAS; Coordinate and implement traffic management directives if needed for area of responsibility; Monitor and balance traffic flows within the area of responsibility in accordance with traffic management directives; Evaluate effectiveness of traffic management directives and make necessary adjustments; Document delay information.

Interfaces

Direct User Access Terminal Service — (Flight Data) → Flight Service Data Processing System

The DUATS service transmits and receives flight plan processing information to FSDPS via FSAS.

Direct User Access Terminal Service — (Weather Data) → Flight Service Data Processing System

The DUATS service transmits and receives current and forecast aviation weather information, Notice to Airmen information, and flight planning services.

Flight Service Data Processing System — (Flight Data) → Peripheral Adapter Module Replacement Item

The FSDPS transmits flight plan data to PAMRI.

Model One Full Capacity ← (Data Communication) → Aeronautical Information System Replacement

Operational and Supportability Implementation System ← (Flight Data) → Direct User Access Terminal Service

The OASIS uses flight plan data from the DUAT service for search and rescue (SAR) activities, and will also exchange SAR related information.

Operational and Supportability Implementation System ← (Flight Data) → Peripheral Adapter Module Replacement Item

The OASIS currently exchanges flight plans and SAR requests with HCS via PAMRI.

Peripheral Adapter Module Replacement Item — (Flight Data) → Host Computer System

The PAMRI is a conduit through which the HCS receives and exchanges flight data with remote FDIO flight strip printer system (printer/display/keyboard) as well as with external automation systems such as ARTS/STARS (TRACON), ODAPS/FDP2000 (Ocean), and FSM (ATCSCC). FDIO uses the General Purpose Input/Output (GPI/O) parallel interfaces and automation systems use the Interfacility Communications Input/Output (INTI/O) serial interfaces.

Peripheral Adapter Module Replacement Item — (Surveillance Data) → Host Computer System

The PAMRI passes surveillance data from the primary/secondary radars to the HCS for processing and use in controlling aircraft.

Peripheral Adapter Module Replacement Item — (Flight Data) → Peripheral Adapter Module Replacement Item

The PAMRI passes flight data between ARTCCs.

Peripheral Adapter Module Replacement Item — (Track Data) → Peripheral Adapter Module Replacement Item

The PAMRI passes track data between ARTCCs.

Issues

none identified

Service Group Air Traffic Services

Service Flight Planning

Capability Flight Data Management

Operational Improvement

Enhance Flight Data Management (101202)

Flight planning and filing up to 180 days before the day of flight receive support. Flight data processing (FDP) incorporates flight data information from the flight deck into the trajectory and conformance modeling. All flight plans are treated as trajectories with protected volumes supporting military operations as well as remotely operated aircraft and reusable launch vehicles. FDP uses volumes of interest to determine the relationship of the trajectory and the interest of service providers. Changes to flight profiles can be negotiated with a strategic planner and updated, which reduces the workload on the tactical provider. This ensures that all changes are consistent with current flow objectives.

31-Jan-2016 to 01-Jan-2019

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

There is complete end-to-end management of the flight from pre-flight to post analysis. Flight planning and filing up to 180 days prior to day of flight is supported in Flight Object Management System, (FOMS). This removes the reliance on Official Airline Guide, (OAG) for future schedules and historical routing to identify potential flight profiles. This provides the information upon which the longer-term strategic flow initiatives can be developed with the users via the Unified Decision

Management System, (UDMS) and Next Generation Traffic Flow Management, (NG-TFM). Further, by filing early the user can receive updates form FOMS via the System Wide Information Management, (SWIM) and Swim Management Unit, (SMU), across the days identifying changes in constraints status allowing for early re-evaluation and re-planning of the flight. This include restrictions for special events, planned NAS outages, etc.

The flight data processing system increasingly incorporates flight data information provided by the flight deck via NEXCOM and Communications Management System, (CMS), into the trajectory and conformance modeling improving the support to service provider and decision support tools. All flight plans are treated as trajectories with protected volumes to allow greater use of variable separations and supports not only military operations formerly managed as Special Use Airspace, (SUAs), in AIM, (Aeronautical Information Management), but the operations of other vehicles such as Remotely Operated Aircraft, (ROAs) and Reusable Launch Vehicles, (RLVs).

The flight plan management system uses volumes of interest to determine the relationship of the projected trajectory and the interest of service providers. This supports the separation assurance and the advisory services through more flexible distribution of flight data, the automatic generation of point outs and the coordination functions in SAP for control of the aircraft. This move to volume also means that the flight data management system can support user preference from runway to runway in FOMS without requiring any fixed routing segments for processing.

Finally there is a change is the ownership of the active profile. Changes to flight profiles beyond the window of the tactical service providers can be negotiated with a strategic planner and updated without requiring the tactical service provider involvement. This reduces the workload on the tactical provider while placing the responsibility into the hands of strategic flow FOMS and NG-TFM better ensuring the change is consistent with current flow objectives.

Benefits

The flight data management system provides status and trajectories based on the aircraft dynamics and route of flight. Entry into a volume of interest and the point of piercing is calculated and not pre-ordained/constrained. This facility supports coordination between facilities with greater flexibility than today helping keep access to airports open by readily facilitating re-routes, supporting more flexible use of controller/capacity assets by managing data based on volumes of interest that can be redefined to meet change to airspace/ routings. This flexibility allows the NAS to maintain major flows in the face of off-nominal conditions.

Systems

Aeronautical Information Management (key system)

The AIM system represents the evolution of the acquisition, storage, processing and dissemination of aeronautical information in the NAS. Aeronautical information is defined as any information concerning the establishment, condition, or change in any component (facility, service, or procedure of, of hazard) of the National Airspace System. Aeronautical information comes in two types a somewhat static type, and a more dynamic type. The static portion represents the aeronautical information baseline as a particular date, while the dynamic portion updates particular aspects of the static portion due to system impacts or events. The Static portion represents data that NAS automation systems and other users use to adapt their software to properly operate. The dynamic portion represents information typically contained in NOTAMs that indicate short-term changes to the static data.

Many NAS systems support the acquisition, generation, and dissemination of the static aeronautical information. Information of this type includes airspace structures, airways, locations of NAS facilities, inter-facility letters of agreement and memorandums of understanding, obstructions, standard procedures, airspace charts, etc.

Several NAS systems also support the acquisition, generation, processing, and dissemination of the dynamic aeronautical information. Information of this type includes, facility outages, runway closures, temporary flight restrictions, airspace constraints, SIGMETs, etc. This information must be disseminated to users and providers of air traffic services in a timely and efficient manner.

AIM will provide the central point for the dissemination of high quality, configuration controlled information to NAS systems, service providers and users of the NAS. AIM will disseminate data based on the Aeronautical Information Exchange Model (AIXM) protocols.

Communications Management System (key system)

The CMS Management and Control function performs tasks for overall management and control of all air/ground and ground/ground voice and data communications to support System Wide Information Management (SWIM). CMS will also incorporate a reconfiguration control function to support reconfigurable airspace assignments, data routing, and a digital recording for both voice and data.

The En Route Automation Modernization program has assumed the data recording function via the Standard Automation Platform, and the Digital Voice Recorder System performs the voice recording function. The CMS routing function is a data router that ensures transport of data communications among Air Traffic Control facilities and users of SWIM. Additionally, CMS integrates functionalities inherently provided by the voice switches, the voice recorders, and the ATN Router.

Flight Object Management System - En Route

The FOMS is a component of the Standard Automation Platform (SAP). The FOMS processes flight data received from multiple sources via the System Wide Information Management (SWIM) Management Unit. The FOMS also receives track data from the Surveillance Data Processor and associates tracks with flight data, producing the flight object, which is published to SWIM for subscriber use. Flight plan support functionality includes end-to-end profile evaluation in all phases of flight and evaluation against static and dynamic constraints (terrain, obstacles, airspace restrictions, etc.). The FOMS supports flight planning up to 180 days prior to day of flight. A user can access the flight object from initial to closeout in the same manner. The FOMS provides end-to-end flight data management from preflight to post analysis. Ownership of the flight object begins and ends with Traffic Flow Management and transitions during the flight to clearance delivery, ramp, surface, departure, transition to cruise, cruise, transition to arrival, and ramp. Flight data management is based on trajectory, assigned volumes, and "necessary" route structure.

Flight Object Management System - Terminal (key system)

The FOMS is a component of the Standard Automation Platform (SAP). The FOMS processes flight data received from multiple sources via the System Wide Information Management (SWIM) Management Unit. The FOMS also receives track data from the Surveillance Data Processor (SDP) and associates tracks with flight data, producing the flight object, which is published to SWIM for subscriber use. Flight plan support functionality includes end-to-end profile evaluation in all phases of flight and evaluation against static and dynamic constraints (terrain, obstacles, airspace restrictions, etc.). The FOMS supports flight planning up to 180 days prior to day of flight. A user can access the flight object from initial to closeout in the same manner. The FOMS provides end-to-end flight data management from preflight to post analysis. Ownership of the flight object begins and ends with Traffic Flow Management and transitions during the flight to clearance delivery, ramp, surface, departure, transition to cruise, cruise, transition to arrival, and ramp. Flight data management is based on trajectory, assigned volumes, and "necessary" route structure.

Flight Plan Pre-Processor (key system)

The FPPP will permit airlines to submit trial plans for evaluation up to 24 hours in advance, as well as providing early intent FPs to improve the predictive accuracy of ETMS traffic flow models by providing more accurate routing data to ETMS earlier in the planning process. FPPP will also simulate a capability to accept flight plans to be filed, which will be forwarded to the respective NAS Host. This capability will permit the filing of flight plans to a single destination, instead of to the 20 NAS Host systems. FPPP is being developed as a significant step in a multi-phased approach aimed at providing airlines with analytical tools to support flight plan preprocessing.

Flight Service Automation System Power Conditioning System

The Flight Service Automation System Power Conditioning System (FSAS Pwr Cond Sys) provides power-conditioning systems for Flight Service Station (FSS) facilities.

Integrated Information Workstation - Build 1 (key system)

IIW Build 1 will include the infrastructure and system interfaces to acquire, analyze, store, update, display, and manage the following information in an integrated manner: (1) National Airspace System (NAS) aeronautical, (2) airport environmental, (3) airborne and surface surveillance, (4) flight information, (5) weather information, and (6) NAS status. Build 1 will also replace its predecessor system, FAA Data Display System, as well as interface with the following systems in support of its mission: Flight Object Management, System Wide Information Management, Next Generation- Traffic Flow Management, Maintenance Management System, Unified Decision Management System, and Aeronautical Information Management.

Next Generation Traffic Flow Management (key system)

The Next Generation Traffic Flow Management (NG-TFM) system provides an array of automation and data processing tools for Traffic Management Specialists (TMS) and Traffic Management Coordinators (TMC), as well as a gateway that enables NAS users to make changes in flight schedules based on planned traffic initiatives (e.g., Ground Delay Programs) and other NAS data. This enhanced decision support system provides increased information exchange between FAA service providers and NAS users. NG-TFM receives flight schedules from NAS users (e.g., air carriers) and combines these with weather data, NAS status data, and planned traffic initiatives to generate detailed graphical and textual traffic displays as far as 24 hours into the future on both national and local scales. Features include both pre-flight and post-flight analysis tools, flight data archiving, enhanced traffic displays, traffic strategy (one or more initiatives) automation, "what if" strategy analysis, and automated TFM training tools.

NG-TFM is comprised of five different software component systems and will include a hardware and operating system software tech refresh. The complete NG-TFM software package includes changes to support interfaces with the Flight Object Management System (FOMS) and System Wide Information Management (SWIM). When complete, this will establish a new NG-TFM system baseline.

Power Systems

The Power Systems (Pwr Sys) mechanism provides for the conditioning of commercial power, including uninterruptible power systems (UPS), to eliminate voltage dropouts, surges, and voltage sags caused by sources outside the facility. Power distribution, grounding, bonding and shielding of electrical system within the facility is also part of the Pwr Sys.

The Power Systems (Pwr Sys) mechanism provides the following: 1.) ACEPS Busway Replacements, 2.) ACEPS EG Maintenance, 3.) ACEPS Monitoring & Diagnostics, 4.) ACEPS Fuel System Upgrade, 5.) ACEPS Training, 6.) Battery Monitoring, 7.) Training Facility, 8.) CPDS, 9.) Battery Replacements, 10.) DC Systems, 11.) EG, 12.) LPGBS, 13.) Power Cable, 14.) UPS, 15.) Contract Support.

Standard Automation Platform Convergence Phase 1 (key system)

The purpose of Standard Automation Platform Convergence Phase 1 (SAP Conv P1) is to reduce both procurement and recurring costs by standardizing and sharing as many hardware and software ATC Automation components as possible.

An engineering convergence task will begin in fiscal year 2005 and run through 2015. All components from each of the automation systems (STARS, ERAM, TFM, etc.) will be analyzed, and the "best of breed" and "core" components will be selected. SAP convergence will be performed in the following areas: (1) Hardware; (2) System Software (operating systems, Commercial-Off-The-Shelf tools, etc.); (3) ATC applications that can be shared across domains; (4) ATC applications that are unique to a domain; and (5) ATC system support tools that can be shared across domains (adaptation, data extraction or systems analysis recording, data reduction and analysis tools, etc.). Proven STARS and ERAM components will be slected, integrated into the SAP, and rigorously tested for replacing STARS and ERAM components at or near their end of service life.

Prototyping begun under Phase 1 will continue with SAP Conv P2. The results of both efforts will lead to refining the requirements to develop the SAP WS mechanism with SDP and FOMS applications.

System Wide Information Management Build 1B

Build 1B provides all items in 1A, including more NAS information. This build integrates Flight and Surveillance Information systems into the SWIM architecture.

Unified Decision Management System (key system)

The Unified Decision Making System (UDMS) enhances the Collaborative Decision Making (CDM) process by enabling NAS users and the FAA to share flight schedules, planned traffic initiatives (e.g., Ground Delay Programs), advanced traffic flow predictions, and other NAS data electronically. UDMS upgrades the basic CDM functionality of the TFM-M system hub that connects to user-owned data networks. NAS users gain access to more sophisticated graphical and textual traffic flow predictions, as well as automated planning and analysis tools.

People

Airline Operations Center Dispatcher

The Airline Operations Center Dispatcher (AOC Dispatcher) is a major airline employee that enters bulk flight plan requests and works with FAA by revising schedules and providing flight cancellations based on FAA provided data (aggregate demand lists, arrival rates, and parameters for anticipated ground delays.)

Clearance Delivery

A Clearance Delivery Controller performs the following activities: Operate communications equipment; process and forward flight plan information; issue clearances and ensure accuracy of pilot read back; assist tower cab in meeting situation objectives; operate tower equipment; utilize alphanumerics.

Flight Data Controller

A Flight Data Controller performs the following activities: Operate interphone; Assist Radar Associate Controller in managing flight progress strips; Receive/process and distribute flight progress strips; Ensure flight data processing equipment is operational; Request/receive and disseminate weather, NOTAM's, NAS status, traffic management, and Special Use Airspace status messages; Manually prepare flight progress strips when automation systems are not available; Enter flight data into computer; Forward flight data via computer; Assist facility/sector in meeting situation objectives.

Flight Service Specialist

A Flight Service Specialist performs the following activities:

* Provide services to aircraft in flight and during the pre-flight phase,

* Monitoring and restoration of NAVAID; Issuing local airport advisories,

* Relaying ATC clearances, advisories or requests,

* Issuing military flight advisory messages,

* Receiving and issuing NOTAMS,

* Assisting is search and rescue communication searches,

* Activating and closing flight plans,

* Making unscheduled broadcasts,

* Soliciting and issuing PIREPS,

* Presenting pilot weather briefings to airborne aircraft,

* Locating lost aircraft,

* Recording aircraft contacts,

* Providing weather advisories and flight plan services,

* Providing hazardous area reporting services, and

* Keeping airmen and weather information current.

Ground Controller

A Ground Controller performs the following activities: Ensure separation; Control vehicles as well as aircraft on movement areas other than active runways Initiate control instructions; Monitor and operate communications equipment; Utilize tower radar display(s); Utilize alphanumerics; Assist the tower associate controller with coordination; Scan tower cab environment; Ensure computer entries and strip marking are completed for instructions or clearances issued or received; Process and forward flight plan information; Perform any functions of the tower team which will assist in meeting situation objectives; Coordinate with local control for safe and efficient use of runways and movement areas.

Local Controller

A Local Controller performs the following activities: Ensure separation; Control active runways; Initiate control instructions; Monitor and operate communications equipment; Utilize tower radar display(s); Utilize alphanumerics; Assist the tower associate controller with coordination; Scan tower cab environment; Ensure computer entries and strip marking are completed for instructions or clearances issued or received; Process and forward flight plan information; Perform any functions of the tower team which will assist in meeting situation objectives; Coordinate with ground control for safe and efficient use of runways and movement areas.

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Preflight Position

A Preflight Position performs the following activities: Brief and translate to pilots current weather, NOTAMS, flow control restrictions; Apply VFR not recommended procedures.

Radar Associate Controller

A Radar Associate Controller performs the following activities: Ensure separation, initiate control instructions; operate interphones; Accept and initiate non-automated handoffs; and ensure radar controller is made aware of the actions; Assist the radar controller by accepting or initiating automated handoffs/pointouts which are necessary for the continued smooth operation of the sector, and ensure that the radar controller is made immediately aware of any action taken; Coordinate, including pointouts; Monitor radios when not performing higher priority duties; Scan flight progress strips; Correlate with radar data; Manage flight progress strips; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the radar controller when aware of those instructions.

Radar Controller

A Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate automated handoffs; Assist the radar associate controller with non-automated handoff actions when needed; Assist the radar associate controller in coordination when needed; Scan radar display; Correlate with flight progress strip information; Ensure computer entries are completed on instructions or clearances you issue or receive; Ensure strip marking is completed on instructions or clearances you issue or receive.

Traffic Management Coordinators

Traffic Management Coordinators track and predict traffic flows, analyze ground delays, evaluate alternative routing strategies, and plan local traffic patterns at the local facility (ARTCC, TRACON, or Towers)

Traffic Management Specialist

Traffic Management Specialists perform the following activities: Balance air traffic demand with the airspace's capacity to maintain maximum and efficient utilization of the NAS; Coordinate and implement traffic management directives if needed for area of responsibility; Monitor and balance traffic flows within the area of responsibility in accordance with traffic management directives; Evaluate effectiveness of traffic management directives and make necessary adjustments; Document delay information.

Interfaces

Aeronautical Information Management — (Data Communication) → Integrated Information Workstation - Build 1

AIM sends NOTAMS and other data to the IIW for display.

Communications Management System ← (Data Communication) → Communications Management System

Controllers in the same or different facilities communicate via CMS.

Communications Management System ← (Voice Communication) → Communications Management System

Controllers in the same or different facilities communicate via CMS.

Flight Object Management System - Terminal ← (Data Communication) → Integrated Information Workstation - Build 1

FOMS sends traffic management decision support tool information to IIW. IIW serves as the controller interface to the tools.

Flight Object Management System - Terminal ← (Flight Data) → Next Generation Traffic Flow Management

FOMS and NG-TFM exchange flight data.

Next Generation Traffic Flow Management — (NAS Status Data) → Communications Management System

NG-TFM determines the best use of NAS resources and directs CMS to reconfigure communication resources accordingly.

Next Generation Traffic Flow Management — (Data Communication) → Integrated Information Workstation - Build 1

NG-TFM provides traffic flow management data to the IIW for display to controllers.

Issues

·Need Concept of Use for Flight Management for early filing and maintenance of flight profiles (changes from the anticipation of flights based on OAG and historical use) to strategies for user early filing and its role in asset assignment. ·Need Concepts of Flight Management (Strategic Flow to Clearance delivery) ·Need Airspace Management's development of Flexible Airspace and Dynamic Re-sectorization to exploit advance flight management capabilities for benefits ·Need to identify event triggers within Flight Data Management to trigger trajectory updates - clearance deliver, hand-off coordination, etc to improve both traffic synchronization and strategic flow. ·Need a Concept of Use for incorporation of flight deck information to improve trajectory prediction ·Need a concept of use for the delivery of flight information to other government agencies

Service Group Air Traffic Services

Service Flight Planning

Capability Flight Plan Support

Operational Improvement

Current Flight Plan Support (101101)

NAS users receive essential weather and aeronautical information to support flight planning. Flight planning requires such information as expected route, altitude, time of flight, available navigation systems, available routes, special use airspace restrictions, daily demand conditions, and anticipated flight conditions, including weather and sky conditions (e.g., the presence of volcanic ash, smoke, and/or birds). NAS flight plan processing provides evaluation and feedback for both domestic and international flight plans. Aeronautical information includes notices to airmen concerning establishment or condition of, or change in, any NAS component (i.e., facility, service, or procedure) or NAS hazard. Users need to receive this information in a timely manner because it is essential to flight.

01-Sep-2000 to 31-Dec-2010

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

A Flight Plan (FP) is a pilot's stated intentions to conduct a flight by documenting the who, where, when, what, and how of the flight. It also contains some required information related to potential emergency situations. The "how" part of the flight not only specifies the route to be flown but also the type of flight; for example, will the flight be under Visual Flight Rules (VFR) or Instrument Flight Rules (IFR) or a combination of both. The "where" determines whether the FP will be domestic or international. The FAA clearly and aggressively encourages pilots to file a FP, if for no other reason than for timely Search and Rescue protection. It has also been shown statistically that when a pilot makes the effort to file a FP, he/she will, more often than not, obtain a more thorough pre-flight briefing on weather, NOTAMs (Notice To Airmen), potential flight hazards, etc., which enhance the safety of the flight. Although all Air Traffic Service (ATS) facilities have some duties associated with flight plan support, the FAA's Automated Flight Service Stations (AFSS) and Automated International Flight Service Stations

(AIFSS) are the ATS facilities primarily responsible for providing flight-planning services for the civil and military pilots operating in this country.

The first step in flight plan support is constraint checking. This may be done through automated methods using FAA provided advisory information, or by contacting the AFSS. The initial focus of Flight Plan Support is on the Weather Briefing. The Airmans Information Manual states that pilots-in-command, before beginning a flight shall familiarize themselves with all available information concerning that flight. Flight Service Stations are the primary source for obtaining preflight briefings and in-flight weather information. Pilots may walk into a Flight Service Station to review available aviation weather products and charts, or they may choose to use telephones, voice radio communications, or personal computer using the Direct User Access Terminal (DUAT) service. Flight Service Specialists have access to various types of aeronautical information in order to properly prepare comprehensive pre-flight briefings; assisting the flight en route; and assisting the airport owner in developing a master plan for maintenance, security, and improvement of the airport. This information consists of weather observations, forecasts and advisories; status of navigational aids; and airport conditions. Weather information is provided by the FSDPS and is tailored to what is important along a planned route of flight. Other information available via the Flight Service Data Processing System, (FSDPS), to assist the Flight Service Specialist in preparing briefings includes: Notices to Airmen (NOTAM). This information notifies controllers and pilots of changes in the status of airports and associated equipment. NOTAMs are forwarded to the FSDPS via the Weather Message Switching Center Replacement, (WMSCR) from the Consolidated NOTAM System. Pilot reports (PIREPS) from airborne aircraft provide a means of determining the weather conditions en route at a given altitude. PIREPs are entered manually into the AFSS facility by Flight Service Specialists and processed and distributed by the FSDPS network to tower, Terminal Radar Approach Control, (TRACON), and Air Route Traffic Control Center, (ARTCC) facilities via WMSCR. It is also made available to the DUAT service.

Once the constraints have been evaluated, a flight plan is prepared and submitted for filing. Pilots filing FPs in the NAS can use the following options: Filing a FP with an AFSS (Walk-in, Radio, Fast File, Broadcast or Telephone) Filing a FP with an Commercial Service Provider DUATS AIS, (Aernautical Information System) (Military & Air Carrier, Military Base Operations, [MBO]) Filing with an Airline Operations Center, (AOC) (Air Carriers, MBO) Filing with a FP with an ARTCC, TRACON, CERAP, ATCT, RAPCON, RATCF

When a flight plan is received into the system the flight plan is checked for errors and conformance to flow constraints. When a FP is filed person-to-person, the Specialist (AFSS, BASOPS, AOC, etc.) receiving it checks it for omissions, errors, format, and timeliness. The AFSS Specialist then enters it into the M1FC, which sends it to the FSDPS. The FSDPS is a system designed solely for managing the massive database containing FPs, weather, etc. AFSSs also use AIS, but only as a backup for the M1FC, and then primarily as the backup for the Air/Ground weather briefing positions. The FSDPS also checks the FP for errors in continuity and format and, if the FP is correct, it routes the FP to the ARTCC's Host Computer System (HCS) at the proper lead-time. Whether filed via an AFSS or through another method, the HCS will also check the FP for errors and NAS traffic constraints. If problems are found the FP is rejected.

The final checking is conducted when the FP is ultimately routed to the FSP (Flight Strip Printer) at the ARTCC Sector and/or the FDIO (Flight Data Input/Output) printer at the terminal facility to be checked by the controller who will first work the aircraft. The Flight Data, Clearance Delivery, Departure or Arrival Controller, or even an Enroute Controller if proposed off a non-controlled airport outside the TRACON's airspace, checks the FP to ensure it complies with the routing and altitudes mandated by the Air Traffic Control directive, Inter-facility Letters-of-Agreement, and internal procedures. He/she then makes any additions, changes, etc., as needed for compliance and files the Flight Strip in the designated location for proposal strips. Feedbacks on these constraints on the FP and service provider changes to the FP are provided to the pilot at clearance delivery. These changes may not be acceptable to the pilot and the user may reject the FP. A new plan will then need to be developed and submitted to the NAS.

Benefits

Current operations are provided in the NAS.

Systems

Aeronautical Information System Replacement (key system)

The Aeronautical Information System (AISR) is a web based replacement system for the obsolete, maintenance intensive, non-Year 2000 (Y2K) compliant Leased A and B service (LABS) GS-200 system. AISR provides a workstation to: (a) process flight plans (file, amend, cancel, store and transmit) including ICAO flight plans, (b) retrieve aeronautical weather from WMSCR, collectives and AIS, and (c) process Notice to Airmen (NOTAM) (collect and distribute). AIS uses FAA IP Routed Multi-user Net (FIRMNet) for access by 60+ flight data (FD) specialists in ARTCCs, 60+ in AFSSs, and 10+ in FAA Regional Offices (ROs). It uses Non-classified Internet Protocol Router Network (NIPRNet) for access by 60+ Military Base Operations (MBOs), dedicated lines for access by 20+ Meteorological Weather Processing Centers and National Airspace Data Interchange Network (NADIN) Packet-Switched Network (PSN) for access to the Weather Message Switching Center Replacement (WMSCR). Alternate access is available via toll free service to a local service provider. The primary AIS server is located in the National Network Control Center (NNCC) Salt Lake City facility and the back-up server is located in Chantilli VA.

Military base operations uses AIS for flight plan input.

Aeronautical Telecommunication Network Air to Ground Router

The Aeronautical Telecommunications Network (ATN) Air to Ground Router (ATN A/G Router) provides air/ground data communication complying with International Civil Aviation Organization (ICAO) Annex 10 formats.

The ATN Program Office, AOS-900, entered into an agreement with the Japanese Civil Aviation Bureau (JCAB) on February 12, 1998. This agreement initiated trial and connectivity testing to implement ATN and the FAA owned ATS Message Handling System (AMHS) service to support the anticipated additional air traffic demands in the Asia/Pacific region. The FAA and JCAB successfully conducted connectivity and interoperability testing during 2001.

OKI Electric Industry Co. LTD (OKI) developed ATN router software for use by the JCAB air traffic control system. This unique and proprietary OKI software follows strict international aviation development guidelines and uses the Windows NT operating system. The FAA employed the OKI router software during successful compatibility and interoperability testing with JCAB in 2001 and it was found to meet all the desired technical and operational requirements. The FAA uses the OKI router software for the international data service component of ATN and if used in the U.S. will provide an economy of scale, operational efficiency, interoperability and commonality of equipment.

The FAA is required to obtain the software and support drivers in March 2003 to meet the integration and security processes needed for the initiation of the service with Japan. The agreement between the FAA and JCAB specifies the need to have the system deployed by August 2003 in order to initiate ATN service by March 2004.

Note: This router does not currently support NEXCOM, but could possibly be used as the ATN Backbone required in the future.

Air Route Surveillance Radar - Model 1E

The Air Route Surveillance Radar - Model 1E (ARSR-1E) is a 1970s analog radar. It is a long-range radar system with a maximum detection range of 200 nm. The ARSR-1E is a surveillance system used to detect azimuth and slant range of en route aircraft operating between terminal areas. It also provides weather intensity data.

Air Route Surveillance Radar - Model 2

The Air Route Surveillance Radar - Model 2 (ARSR-2) is a 1970s analog radar. It is a long-range radar system with a maximum detection range of 200 nm. The ARSR-2 is a surveillance system used to detect azimuth and slant range of en route aircraft operating between terminal areas. It also provides weather intensity data.

Air Route Surveillance Radar - Model 3

The Air Route Surveillance Radar - Model 3 (ARSR-3) is a 1980s radar that provides primary long range surveillance data, including slant range and azimuth data. It processes the returns which includes demodulation, analog-to-digital conversion, moving target indicator function, sensitivity time control, range and azimuth gating, and digital target extraction - all of which are performed digitally (with the exception of the demodulation and analog-to-digital conversion). In addition, the ARSR-3 has a weather channel with associated processing to provide weather contour information in digital format.

Air Route Surveillance Radar - Model 4

The Air Route Surveillance Radar - Model 4 (ARSR-4) is a three-dimensional, long-range, rotating phased array, primary surveillance radar with integrated height finder capability. It is part of the joint surveillance system (JSS) used in conjunction with ARSR-3 coverage as part of the nationwide air defense command surveillance network. In addition to functions peculiar to the military, the ARSR-4 performs the same basic functions of the ARSR-3, by providing primary long-range surveillance data, including slant range and azimuth data.

Air Traffic Control Beacon Interrogator - Model 4

The Air Traffic Control Beacon Interrogator - Model 4 (ATCBI-4) is an air traffic control (ATC) beacon system that interrogates transponder-equipped aircraft. It is a secondary radar system that interrogates transponders, receives aircraft identification, and determines position data.

Air Traffic Control Beacon Interrogator - Model 5

The Air Traffic Control Beacon Interrogator - Model 5 (ATCBI-5) is an air traffic control (ATC) beacon system that interrogates transponder-equipped aircraft. It is a secondary radar system that interrogates transponders, receives aircraft identification, and determines position data.

Air Traffic Control Beacon Interrogator - Model 6

The Air Traffic Control Beacon Interrogator Model 6 (ATCBI-6) is a ground-based system that interrogates transponders, receives and processes replies from transponders, determines the range and azimuth to the aircraft, and forwards the information to appropriate air traffic control (ATC) automation systems. Replies provide identification and altitude data of the transponder.

Air Traffic Operational Management System

The Air Traffic Operational Management System (ATOMS) collects and distributes real-time air traffic operational data and management information throughout the National Airspace System (NAS).

Air Traffic Services Interfacility Data Communications System

The Air Traffic Services Interfacility Data Communications System (AIDCS) provides ground-to-ground data link communications between U.S. Oceanic Air Traffic Control (ATC) centers and adjacent Flight Information Regions (FIRs). AIDCS is composed of a workstation processor and gateway router. The workstation serves as a translator between the National Airspace System (NAS) and the International Civil Aviation Organization (ICAO) formats for flight plans and coordination messages. The gateway router interfaces the workstation to the Oceanic Display and Planning System (ODAPS) Flight Data Processor and National Airspace Data Interchange Network II (NADIN II)/Aeronautical Fixed Telecommunications Network (AFTN).

Airport Surveillance Radar - Model 11

The Airport Surveillance Radar- Model 11 (ASR-11) is a digital, combined primary and secondary surveillance radar (SSR), short-range radar system with a 60 nautical mile (nmi) detection range for medium and small activity airports. The ASR-11 provides advanced digital primary radar including weather intensity surveillance with an integrated monopulse SSR system for use in the airport terminal area. The ASR-11 is used to detect and report the presence and location of an aircraft in a specific volume of airspace. The ASR-11 provides search radar surveillance coverage in controlled airspace primarily in terminal areas.

Airport Surveillance Radar - Model 7

The Airport Surveillance Radar - Model 7 (ASR-7) is a short-range (60 nm) analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the Air Traffic Control Beacon Interrogator - Model 4 or Model 5 (ATCBI-4 or ATCBI-5) or Mode S. This system will be replaced by the ASR-11.

Airport Surveillance Radar - Model 8

The Airport Surveillance Radar - Model 8 (ASR-8) is a short-range (60 nm), analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the Air Traffic Control Beacon Interrogator - Model 4 or Model 5 (ATCBI-4 or ATCBI-5) or Mode S.

Airport Surveillance Radar - Model 9

The Airport Surveillance Radar - Model 9 (ASR-9) is a short range (60 nm) radar system for the airport terminal area. The ASR-9 processes the returns from aircraft targets, which includes demodulation, analog-to-digital conversion, range and azimuth gating, sensitivity timing control, and a moving target detection function. The moving target detector includes two-level weather contour processing, digital signal processing, correlation and interpolation processing, and surveillance processing. The ASR-9 has a separate weather channel with associated processing capable of providing six-level weather contours. The two-level weather contour processing associated with the moving target detector is only be used for backup. The six-level weather channel is primarily used to supplement Next Generation Weather Radar (NEXRAD) coverage. It is normally used in conjunction with Mode Select (Mode S) but it can accommodate an Air Traffic Control Beacon Interrogator Model 4/5 (ATCBI-4/5).

The ASR-9 will be upgraded/replaced with the ASR-9/Mode S SLEP (see separate mechanism) in the 2007-12 time frame.

Alaskan National Airspace System Interfacility Communications System

Alaskan NAS Interfacility Communications System (ANICS) uses FAA-owned satellite earth stations and leased transponders on communications satellites to provide reliable telecommunication services. ANICS Phase I sites provide critical communications with 99.99% availability by using two sets of equipment and two satellites in parallel. ANICS Phase II sites will provide essential communications with 99.9% availability by using one set of equipment and one satellite. ANICS Phase II uses commercial off-the-shelf (COTS) equipment in a redundant configuration to provide high availability and reliability. Phase II sites are enclosed in radomes that protect the equipment and antenna from the weather. The ANICS equipment provides remote maintenance monitoring and control. The equipment is controlled and operated from the Network Operations Control Center (NOCC), centrally located in the Anchorage ARTCC.

Automated Flight Service Station Display

The Automated Flight Service Station Display (AFSSD) is a DOS-based workstation located at each specialist position. It provides alphanumeric text information of flight and NOTAM data in an un-integrated manner.

Automated Flight Service Station Facilities Sustainment

The Automated Flight Service Station (AFSS) Facilities Sustainment (AFSS Facilities Sustainment) program improves and modernizes all flight service facilities to ensure timely and efficient service as well as a safe working environment for flight service specialists, technicians and other personnel. This program provides support for ceilings, floors, walls, doors, electrical and power systems, fire alarm and detection systems, heating, ventilation and air conditioning systems, lightning protection, grounding, bonding, and shielding, parking lots, fencing, plumbing, and roofing.

Automated Lightning Detection and Reporting System - To be deleted

The Automated Lightning Detection and Reporting System (ALDARS) is a system that acquires lightning information and integrates that data into the appropriate ASOS/AWOS observation to report the occurrence of a thunderstorm. It is now operational at numerous AWOS sites and is expected to become operational in all FAA ASOS sites.

Automated Radar Terminal System - Model IIE

The Automated Radar Terminal System - Model IIE (ARTS IIE) provides radar data processing (RDP) and decision support tools to the controller in the terminal environment. Utilized at low to medium-size Terminal Radar Control (TRACONs) Facilities the ARTS IIE is capable of receiving input from up to 2 sensors, can process up to 256 tracks simultaneously, and support up to 22 displays. The ARTS IIE implements the Common ARTS software for improved performance maintenance efficiency. The radar data processing (RDP) software provides automated surveillance tracking and display processing. Included in the ARTS IIE software are decision support tools such as Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Mode C intruder alert, Converging Runway Display Aid (CRDA), and Controller Automation Spacing Aid (CASA).

Automated Radar Terminal System - Model IIIA

The Automated Radar Terminal System - Model IIIA (ARTS IIIA) provides radar data processing (RDP) and decision support tools to the controller in the terminal environment. Utilized at larger airports, ARTS IIIA is capable of receiving input from up to three sensors, can process up to 900 tracks simultaneously and support up to 36 displays. The RDP software provides automated surveillance tracking and display processing. Included in the ARTS IIIA software are decision support tools such as Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Mode C intruder alert, Converging Runway Display Aid (CRDA), Final Monitor Aid (FMA), and controller automation spacing aid.

Automated Radar Terminal System - Model IIIE

The Automated Radar Terminal System - Model IIIE (ARTS IIIE) consists of the hardware platform and software required providing radar data processing (RDP) and decision support tools to the controller in the terminal environment. The ARTS IIIE is used at consolidated Terminal Radar Approach Control (TRACON) facilities. The Common ARTS program provided an ARTS IIIE capable of receiving input from up to 15 sensors, the ability to process up to 10,000 tracks simultaneously, and support up to 223 displays. The RDP software provides automated surveillance tracking and display processing including mosaic display of radar data. Included in the ARTS IIIE software are decision support tools such as Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Mode C intruder alert, Converging Runway Display Aid (CRDA), Final Monitor Aid (FMA), and controller automation spacing aid.

Automated Radar Terminal System Color Display

The Automated Radar Terminal System (ARTS) Color Display (ACD) is a high performance, full function, color display that replaces the Full Digital ARTS Display (FDAD) and the Data Entry and Display Subsystem (DEDS). The ACD supports keyboard and trackball functions for the ARTS IIA, ARTS IIE, and ARTS IIIE. A primary and secondary radar data path to the ACD is provided by a radar gateway function incorporated in the event of a failure of either the ARTS IIE and ARTS IIIA processing systems.

Automated Surface Observing System

The Automated Surface Observing System (ASOS) is an automated observing weather system sponsored by the FAA. ASOS provides weather observations, which include: temperature, dew point, wind, altimeter setting, visibility, sky condition, and precipitation. ASOS routinely and automatically provides a computer-generated voice to provide weather information directly to aircraft in the vicinity of airports using FAA very high frequency (VHF) ground-to-air radio. In addition, the same information is available through a dial-in telephone and most of the data is provided on the national weather data network.

Automated Surface Observing System Pre-Planned Product Improvement

The Automated Surface Observing System P3I will improve the automated sensors performance. These include an ASOS processor upgrade, improved dew point sensor, ice-free wind sensor, enhanced precipitation identifier, and a 25,000-foot ceilometer.

Automated Weather Observing System/Automated Surface Observing System Data Acquisition System

Automated Weather Observing System/Automated Surface Observing System Data Acquisition System (ADAS) collects, analyzes, and redistributes weather information to support the NAS. The ADAS receives minute by minute AWOS (also ASOS, non-Federal AWOS and Department of Defense automated observation system) weather messages. ADAS distributes surface observation weather messages to the Weather and Radar Processing (WARP) system and the Weather Message Switching Center Replacement (WMSCR) system. The ADAS also receives cloud-to-ground lightning strike information from a national network of sensors and distributes this information to the appropriate ASOS/AWOS site.

Automated Weather Observing System/Automated Surface Observing System Data Acquisition System Tech Refresh

Automated Weather Observing System/Automated Surface Observing System Data Acquisition System Tech Refresh sustains the ADAS functionality by implementing minor hardware and software updates.

Automated Weather Observing System/Automated Surface Observing System Data Acquisition System Upgrade

Automated Weather Observing System/Automated Surface Observing System Data Acquisition System Upgrade (ADAS Upgrade) entails a major upgrade to increase its processing and dissemination efficiency as well as incorporating data from new ASOS sensors (e.g., 25kt ceilometers, enhanced precipitation identifier, etc). This upgrade will also ingest and process new data sets from snowfall gauges as well as cloud-cloud lightning data correlating the position to the appropriate ASOS/AWOS site.

Aviation Weather Processor

The Aviation Weather Processor (AWP) provides a centralized capability for the Flight Service Automation System (FSAS) to collect and process alphanumeric weather and Notice to Airmen (NOTAM) information for dissemination to a Flight Service Data Processing System (FSDPS).

Commercial Communications Service Provider

Commercial Communications Service Provider (CCSP) is a commercial entity who provides communications services for a fee.

Commercial Weather Vendor

Commercial Weather Vendor is a company that provides weather products and information for a fee.

Digital Bright Radar Indicator Tower Equipment

The Digital Bright Radar Indicator Tower Equipment (DBRITE) is a tower display system that provides a raster scan presentation of radar/beacon videos and automation system alphanumeric data. The system accepts radar, beacon, external map, analog data, and automation system data.

Digital Voice Recorder System

Provides modern digital voice recording devices used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

In Feburary 2004, the DVRS was upgraded with a 24-channel card, which replaced the 16-channel card. This minor upgrade, called DVR II, was not extended to the systems installed prior to February 2004.

Digital Voice Recorder System Replacement

The Digital Voice Recorder System Replacement (DVRS Replacement) is a modern digital system used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

Direct Access Radar Channel

The Direct Access Radar Channel (DARC) provides a back-up processing path to provide surveillance data to the displays in the event of a primary channel (Host Computer System (HCS) failure. The DARC path is a physically, logically and electrically separate processing path (with diverse hardware and software) from the primary Host Computer System (HCS) Radar Data Processing (RDP) paths. Thus DARC provides a tertiary path, to keep radar data on the controller"s displays, should both HCS RDP paths be disabled for any reason. The DARC provides radar data processing, very limited flight data processing, but with significantly less functionality than the HCS. Basically, DARC serves as a lifeboat should both HCS processing paths become disabled.

Direct User Access Terminal Service (key system)

Direct User Access Terminal Service (DUATS) is a vendor-provided service giving pilots convenient access to pre-flight aeronautical and weather information for flight planning. Allows pilots to input instrument flight rules (IFR), international civil aviation organization (ICAO), and visual flight rules (VFR) flight plans into the system.

Display System Replacement

The Display System Replacement (DSR) provides continuous real-time, automated support to air traffic controllers for the display of surveillance, flight data and other critical control information. This information is processed by the Host and Oceanic Computer System Replacement (HOCSR) and the Enhanced Direct Access Radar Channel (EDARC) subsystems. The DSR provides controller workstations, displays, and input/output devices and a communications infrastructure to connect the DSR with external processing elements of the en route ATC automation system.

En Route Communications Gateway

The En Route Communications Gateway (ECG) replaces PAMRI and provides a modernized LAN-based infrastructure capable of accommodating ERAM with minimal modifications. The PAMRI functions to be replaces include providing communications interfaces to external systems located in other ARTCCs, TRACONs, AFSSs, ATCSCC, NORAD, US Law Enforcement, US Customs, Military Base Operations, and international ACCs. Other interfaces include the FDIO Central Control Unit, which exchanges FDIO data with FAA and DOD facilities, and the NADIN Concentrator, which exchanges data through the NADIN PSN with the the M1FC via WMSCR. ECG increases the number of external interfaces to radars from 24 to 36. ECG provides internal interfaces between HCS and DARC (or EBUS) and between HCS and traffic flow processors such as ETMS and DSP. ECG includes a Monitor and Control subsystem and a display for monitoring up to two dozen radars--called the Random Access Plan Position Indicator (RAPPI).

The operational components of ECG consist of a front end processor (communications and surveillance interfaces), two gateway processors (internal connectivity to HCS and DARC/EBUS), and separate LANs that communicate between the front end and gateway processors on the primary channel and between the front end and gateway processors on the backup channel. The primary data path, consisting of the ECG primary gateway and the HCS, operate on separate hardware platforms. However, the backup data path, consisting of the ECG backup gateway and the EBUS, will operate on the same hardware platform--the ECG gateway platform. This processor, with both functions performed therein, is renamed to the Backup Interface Processor (BIP). In essence, a single processor operates on the backup channel, supporting both the ECG gateway function and the EBUS function. These two functions will remain, however, as two mechanisms in the NAS architecture.

Enhanced Terminal Voice Switch

The Enhanced Terminal Voice Switches (ETVS) are installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) facilities with more than four air traffic controller positions. The ETVS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The ETVS (installed in the ATCT) provides the ATC operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the ETVS.

The ETVS (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within a TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the ETVS.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate ETVS systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

FAA Bulk Weather Telecommunications Gateway

The FAA Bulk Weather Telecommunications Gateway (FBWTG) provides the FAA interface to the National Weather Service (NWS) for the acquisition of gridded model weather forecasts and airborne weather observations (from the Meteorological Data Collection and Reporting System (MDCRS)) used by WARP and ITWS. It also provides a communications gateway for receiving weather advisories/information from the Aviation Weather Center in Kansas City, MO.

FAA Telecommunications Infrastructure

The FAA Telecommunications Infrastructure (FTI) services will replace most FAA-owned and leased telecommunications systems/services and consolidate their functions under a single service provider. The FTI contract will provide services that will meet current and future telecommunications requirements while reducing operational cost.

FTI is implemented in two phases. Phase 1 focuses on establishing an Internet Protocol (IP) backbone among 27 sites that includes ARTCCs, ATCSCC, Volpe, Aeronautical Center, WJHTC, and the two NADIN NNCC''s. Its primary goal is to transition 25 major nodes from the LINCS network. Phase 2 transitions circuits from DMN, BWM, NADIN PSN, and any remaining LINCS circuits.

FTI is a 15-year contract beginning in FY 2002 and ending in FY 2017.

Federal Telecommunications System 2001

Federal Telecommunications System 2001 (FTS 2001) provides for a follow-on lease for Federal Telecommunications System 2000 functions. The telecommunications service contract that will provide administrative and National Airspace System (NAS) telecommunications support for the FAA. FTS 2001 will provide long distance voice, facsimile, video, and data services.

Fixed Position Surveillance Model 20 Series

The Fixed Position Surveillance Model 20 Series (FPS-20 Series) is a military primary radar of various models (FPS-20A, FPS-64, FPS-66A, FPS-67/A/B, and ARSR-60M) used by the FAA to detect slant range and azimuth of en route aircraft operating between terminals in the continental United States. Each of the different radar models is a similar variation of the original FPS-20 military radar.

Flight Data Input/Output

The Flight Data Input/Output (FDIO) system provides flight progress information for use by the Tower, Terminal Radar Approach Control (TRACON) and Air Route Traffic Control Center (ARTCC) controllers. The FDIO system allows Air Traffic Control (ATC) Specialists to input automated flight data, perform data manipulation, and print flight strips.

Flight Data Input/Output Modification (Technical Refresh)

The Flight Data Input/Output Modification (Technical Refresh) (FDIO Mod (Tech Refresh)) mechanism replaces components that are uneconomical to maintain in the system providing an interface between the air traffic controller (terminal or en route) and the center computer. FDIO provides flight plan data in printed form for Airport Traffic Control Tower (ATCT) and Terminal Radar Approach Control (TRACON) controllers.

Flight Data Management - Air Traffic Control System Command Center

The Flight Data Management for Air Traffic Control System Command Center (FDM -ATCSCC) provides the national control center portion of a fully distributed flight data processing capability, using the initial flight object, which includes existing flight plan information and trajectory and performance data (preferred routes, runways). Provides data management and data distribution within the ATCSCC facility.

Flight Data Processing 2000

The Flight Data Processing 2000 (FDP2000) system replaced the oceanic flight data processing capability provided by Offshore Computer System (OCS) at the Anchorage Air Route Traffic Control Center (ARTCC). FDP2000 provides new hardware and software with added capabilities. The added capabilities include winds aloft modeling for improved aircraft position extrapolation accuracy, and support of Air Traffic Services Inter-facility Data Communications Systems (AIDC) ground-to-ground data link with compatible Flight Information Regions (FIRs). The OCS software was re-hosted from the Hewlett-Packard (HP) 1000 platform to the HP 9000 platform. FDP2000 provides flight data to the Microprocessor-En Route Automated Radar Tracking System (Micro-EARTS) radar data processing system. FDP2000 also integrates the existing Controller Pilot Data Link Communications (CPDLC) functions for data link communications with Future Air

Navigation System 1/A (FANS 1/A)-equipped aircraft.

Flight Service Automation System Power Conditioning System

The Flight Service Automation System Power Conditioning System (FSAS Pwr Cond Sys) provides power-conditioning systems for Flight Service Station (FSS) facilities.

Flight Service Data Processing System (key system)

The Flight Service Data Processing System (FSDPS) provides a centralized database and processing capabilities to support the flight services performed by specialists in the associated Automated Flight Service Station (AFSS) facilities. The FSDPS database contains aeronautical information, weather information, and the required flight data to support the various flight service functions (e.g., route-oriented weather briefings and the flight-following function).

Full Digital Automated Radar Terminal System Display

Full Digital ARTS Display (FDAD) is the fully digital ARTS display system that provides the display and data input devices for terminal controllers using ARTS IIIE and ARTS IIIA. The FDAD can work in analog video time share mode or full digital mode. The present application is analog video time share mode.

High Frequency Airborne Radios

High Frequency (HF) Airborne Radios are analog (HF multi-channel radio transceivers operating in the 2 - 30 Mhz frequency band installed in airborne commercial, cargo, and military aircraft transiting the oceanic, en route, terminal, or flight service station airspace domains. These transceivers are typically used in transoceanic applications.

High Frequency Data Link

The High Frequency Data Link (HF Data Link) provides two-way low-speed analog data communications over HF radios. HF Data Link is provided by a communications service provider in the transoceanic domain.

High Frequency Ground Radios

High Frequency (HF) Ground Radios are analog HF radio devices operating in the 2 - 30 Mhz frequency band, which may be single channel transmitters and receivers or multi-channel transceivers. These radio devices are installed at oceanic and en route facilities and used to support tactical air traffic control (ATC) voice communications between a ground controller and a pilot in an aircraft in the oceanic domain. Additionally, these devices are also installed at regional facilities and used to support voice command and control communications /coordination in emergency or during disaster recovery situations occurring in the NAS.

Host Computer System (key system)

The Host Computer System (HCS) receives and processes surveillance reports, and flight plan information. The HCS sends search/beacon target, track and flight data, surveillance and alphanumeric weather information, time data, traffic management advisories and lists to the (Display System Replacement) DSR. The HCS associates surveillance-derived tracking information with flight-planning information. The DSR sends requests for flight data, flight data updates, and track control messages to the HCS. HCS-generated display orders are translated for use within the DSR workstation. While radar data processing is distributed among the terminal and En Route computer resources, the HCS performs virtually all of the flight data processing for its entire geographical area of responsibility. Every tower (ATCT) and terminal radar approach control (TRACON) relies exclusively on its parent HCS for flight data.

The HCS also runs algorithms that perform aircraft to aircraft (conflict alert) and aircraft to terrain (Minimum Safe Altitude Warning) separation assurance. The HCS algorithms provide visual and audible alerting to the controller when conflicts are identified.

The HCS presently supplies real time surveillance, flight data and other information to several decision support tools housed in collocated outboard processors connected via two-way high bandwidth links to the HCS and DSR. These are the (User Request Evaluation Tool, (URET), and the Traffic Management Advisory (TMA. URET performs probing of tentative flight plan changes to determine their viability. TMA provides sequencing and spacing information to align the aircraft in En Route airspace for approach.

Host Computer System / Oceanic Computer System Replacement (key system)

The Host Computer System & Oceanic Computer System Replacement (HCS/OCSR--HOCSR) was implemented because of potential Y2K hardware issues with previous hardware. Accordingly, HCS/OCSR provided a new hardware platform, new peripherals (printers and Keyboard Display Video Terminals--KVDT), a new Direct Access Storage Device (DASD), and new OS-370 software extensions to control the new hardware using legacy NAS software applications. Hardware was replaced in both the En Route and Anchorage Oceanic automation environments. HCS/OCSR did not modify the legacy software functions of either the HCS system (e.g., flight data processing, radar data processing) or the Ocean Display and Planning System (ODAPS) automation systems (e.g., filght data processing). Likewise, HCS/OCSR did not impact HID NAS LAN, URET, DSR or PAMRI.

Phase 1 and 2 (mainframe and software extension replacements) were completed prior to 2000. Phase 3 (DASD replacement) was completed in 2003. Phase 4 (peripheral replacement) will be completed in 2004. Enhancement planned for 2005 and beyond were cancelled as they are overtaken by ERAM. Each phase has its own waterfall, and consequently no waterfall can be provided in the Location section below.

Host Interface Device/National Airspace System Local Area Network

The Host Interface Device/National Airspace System Local Area Network (HID/NAS LAN) is a two-way high-bandwidth LAN connection to the Host Computer System (HCS) to support co-located outboard processing and processes. The HCS presently supplies real-time surveillance, flight data and other information to several decision support tools housed in co-located outboard processors on the HID/NAS LAN. These decision support tools are the Traffic Management Advisory (TMA) and the Controller-Pilot Data Link Communications (CPDLC). Additionally, these tools take data from the HCS, perform their functions, and provide their outputs to HCS via the HID/NAS LAN. Exchange of data between TMA and HCS is via the HID NAS LAN and the Host ATM Data Distribution System (HADDS), a database system based on the Common Message Set (CMS). Exchange of data between CPDLC and DSR is via HID/NAS LAN and HCS. It is anticipated that the En Route Automation Modernization (ERAM) will replace the HID/NAS LAN.

Integrated Communications Switching System Type I

The Integrated Communications Switching System Type I (ICSS I) are installed at Airport Traffic Control Towers (ATCT), Terminal Radar Approach Control (TRACON) facilities, and Automated Flight Service Stations (AFSS).

The ICSS I (installed in the ATCT) provides the air traffic control (ATC) operational ground-ground voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/air traffic control system command center (ATCSCC) specialists. Ground-air radio connectivity between ATCT controllers and pilots is also supported by the ICSS I.

The ICSS I (installed in the TRACON) provides the ATC operational ground-ground voice communications interconnectivity between controllers within TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Ground-air radio connectivity between TRACON controllers and pilots is also supported by the ICSS I.

The ICSS I (installed in the AFSS) provides the ATC operational ground-ground voice communications interconnectivity between specialists within an AFSS (intercom), interconnectivity between specialists in separate AFSSs (interphone), and interconnectivity between Flight Service Station (FSS) specialists and Air Route Traffic Control Center (ARTCC) controllers/TRACON controllers/ATCT controllers/Air Traffic Control System Command Center (ATCSCC) specialists. Ground-air radio connectivity between AFSS specialists and pilots is also supported by the ICSS I.

Integrated Communications Switching System Type III

The Integrated Communications Switching System Type III (ICSS III) is installed at Automated Flight Service Stations (AFSS). The ICSS III (installed in the AFSS) provides the air traffic control (ATC) operational ground-to-ground (G/G)voice communications interconnectivity between specialists within an AFSS (intercom), interconnectivity between specialists in separate AFSSs (interphone), and interconnectivity between Flight Service Station (FSS) specialists and Air Route Traffic Control Center (ARTCC) controllers/Terminal Radar Approach Control (TRACON) controllers/ATCT controllers/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between AFSS specialists and pilots is also supported by the ICSS III.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS II systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Integrated Terminal Weather System

The Integrated Terminal Weather System (ITWS) functions as a weather server in the terminal domain. It acquires data from FAA and National Weather Service (NWS) sensors as well as from aircraft in flight in the terminal area. The ITWS will provide aviation-oriented weather products to Air Traffic Control (ATC) personnel that are immediately usable without further meteorological interpretation.

Integrated Terminal Weather System Display

The Integrated Terminal Weather System Display (ITWS Display) is used in the towers, Tower/Terminal Radar Approach Control (TRACONS), and en route facilities to depict weather that is impacting various ITWS airports.

Integrated Terminal Weather System P3I/Tech Refresh

The Integrated Terminal Weather System (Pre-Planned Product Improvement) (ITWS (P3I) will implement new and enhanced algorithms as well as interfaces to automation system to support Air Traffic Control (ATC) operations. Possible algorithm enhancements include thunderstorm growth and decay, dry microburst detection, snowfall rate predictions, and data quality. Other potential enhancements include improved external user access and terminal winds products. Additionally, the ITWS (P3I) provides the interface between ITWS and the Standard Terminal Automation Replacement System (STARS).

Integrated Terminal Weather System Technological Refresh (TR)

The Integrated Terminal Weather System Technological Refresh (ITWS TR) provides a hardware/software upgrade for ITWS, enabling it to be sustained. Upgrades are implemented to the ITWS processor, the telecommunications module, with increases in RAM and the digital signal processor.

Interfacility Communications

The Interfacility Communications (Interfacility Comm) includes all ground-to-ground communications systems connecting FAA facilities.

Juneau Airport Wind System

Juneau Airport Wind System (JAWS) provides data intended for use by non-meteorologists. Wind data from JAWS will be directly fed to the JNU (Juneau) Air Traffic Control Tower (ATCT). It will also feed the JNU Automated Flight Service Station (AFSS), JNU National Weather Service (NWS), and the Anchorage Center (ZAN Air Route Traffic Control Center (ARTCC)). Wind data will be available to other Alaska aviation users such as Alaska Airlines and general aviation (GA) via the Internet.

Leased Inter-facility National Airspace System Communication System

The Leased Inter-facility National Airspace System Communication System (LINCS) provides transmission channels of various industry-standard types between any specified end points, used to satisfy all FAA operational and some administrative telecommunication requirements.

Low-Density Radio Communications Link

The Low-Density Radio Communications Link (LDRCL) is an FAA owned Low-Density Radio Communications Link (LDRCL) satisfies short-haul, low-density communication requirements. It provides user access (via tail circuits) to a Radio Communications Link (RCL) site or connectivity between two operational facilities

Medium Intensity Airport Weather System

The Medium Intensity Airport Weather System (MIAWS) provides a real-time display of storm positions and estimated storm tracks using Weather Surveillance Radar Model 88D (WSR-88D), also referred to as NEXRAD. This information will be displayed at LLWAS-RS equipped airports (tower and Terminal Radar Approach Control (TRACON) facilities). MIAWS information will also be delivered to aircraft cockpits via the Terminal Weather Information for Pilots (TWIP) and airline dispatchers.

Microprocessor-En Route Automated Radar Tracking System

The Microprocessor-En Route Automated Radar Tracking System (Micro-EARTS) is a radar processing system implemented with Commercial Off-the-Shelf (COTS) equipment, for use in both En Route and Terminal environments. It provides single sensor and a mosaic display of traffic and weather using long- and short-range radars. At Anchorage, Alaska, Micro-EARTS also provides Automatic Dependent Surveillance-Broadcast (ADS-B) surveillance and display. Micro-EARTS interfaces with multiple types of displays, including Display System Replacement (DSR), Digital Bright Radar Indicator Tower Equipment (DBRITE), and the flat panel tower controller displays.

Military Airspace Management System

The Military Airspace Management System (MAMS) is an automated system that schedules and documents Special Use Airspace (SUA) and other related airspace utilization within the DOD. It receives airspace schedule messages (ASM) from local DOD airspace scheduling agencies. The MAMS Central Facility, located at Tinker Air Force Base, Oklahoma, transmits ASMs and utilization data to the FAA Special Use Airspace Management System (SAMS) Central Facility, located at the ATCSCC. The MAMS receives airspace response messages from the SAMS.

Mode 3/AC Transponder

A Mode 3/AC Transponder (Mode 3/AC XPNDR) is a device that responds to an Air Traffic Control Radar Beacon System (ATCRBS) or Mode S interrogation by transmitting a 12-bit code that identifies an aircraft. Mode 3 is the military identity mode. Mode A is the civil identity mode. Mode 3 and Mode A are reported in identical formats and are called Mode 3/A. The Mode 3/A code in the field consists of 12-bits divided into four groups (A, B, C, and D) of three bits each. The Mode 3/A identity code consists of only four digits, each digit being the octal representation of one of the four groups in the field and listed in the order ABCD. A Mode C transponder is a device that responds to a Air Traffic Control Radar Beacon System (ATCRBS) or a Mode Select (Mode S) interrogation by transmitting an altitude gray code from the aircraft blind altitude encoder.

Mode Select

The Mode Select (Mode S) mechanism is a ground-based system capable of selective interrogation of Mode S transponders and general interrogation of Air Traffic Control Radar Beacon System (ATCRBS) transponders within range. The system also receives, processes, and forwards the transponder replies to appropriate air traffic control (ATC) automation systems. Data formats for both interrogation and reply include data exchange capability.

The system also provides a Traffic Information Services (TIS) function that makes local traffic data available to the flight deck via the Mode S data link. TIS, a Mode S data link service, provides automatic traffic advisories to properly equipped aircraft. Pilots are able to request and receive a display of nearby traffic. The relative range, bearing, and altitude (if known) and a "proximate" or "threat" classification of nearby aircraft will be displayed in the cockpit.

Model One Full Capacity (key system)

The Model One Full Capacity (M1FC) system, located at Automated Flight Service Stations (AFSS), interface with a Flight Service Data Processing System (FSDPS) at FAA Air Route Traffic Control Centers (ARTCC). The M1FC is an information processing system used by Flight Service Specialists to collect and distribute Notice to Airmen (NOTAM), weather information, and flight plan related data to General Aviation pilots. In addition, the system supports the timely initiation of search and rescue processing and the capability to reconstruct system events based on time, terminal, or aircraft information.

National Airspace Data Interchange Network Message Switch Network

The National Airspace Data Interchange Network Message Switch Network (NADIN MSN) (sometimes called NADIN 1A) is an integrated store-and-forward telecommunications system consisting of message-switched networks, accessed by remote concentrators. NADIN MSN provides flight plan, weather, and Notice to Airmen (NOTAM) information, and meets the International Civil Aviation Organization (ICAO) requirements for Aeronautical Fixed Telecommunications Network (AFTN) support.

National Airspace Data Interchange Network Packet Switch Network

The National Airspace Data Interchange Network Packet Switch Network (NADIN PSN) (sometimes called NADIN II) is an X.25 packet-switched network that augments and functions in parallel with the National Airspace Data Interchange Network Message-Switched Network (NADIN MSN). Collectively, both networks are known as NADIN. The NADIN PSN is a data communications network composed of packet-switching nodes connected by high-speed digital backbone trunks and controlled by the National Network Control Center (NNCC).

National Airspace System Status Information

National Airspace System Status Information (NASSI) is a database that provides FAA and NAS users a common view of the system status and safety information they require for shared situational awareness and effective traffic flow management decision making.

National Airspace System Status Information Expanded

The National Airspace System Status Information Expanded (NAS Status Info Expanded) provides infrastructure and NAS status data to users. These data includes dynamic Special Use Airspace (SUA). NAS status information deals with increasing the availability of NAS status data to be shared by FAA traffic flow managers and NAS users. Dynamic SUA information allows for increased planning activities associated with free flight when SUA availability is known.

National Weather Service Telecommunications Gateway

The National Weather Service Telecommunications Gateway (NWSTG) is the primary data communications switching facility of the National Weather Service (NWS). The NWSTG provides national and global near real-time data exchange services using automated communication resources, transmitting a wide variety of environmental data types. The NWSTG operates around the clock to acquire, process observations, construct messages, and disseminate messages and files of observations, analysis, and forecast products. The NWSTG connects to the FAA"s FBWTG (at the ATCSCC) and is a major source of gridded weather data as well as aircraft weather observations (MDCRS).

National Weather Service Workstation

The National Weather Service Workstation (NWS Workstation) enables the Meteorologist to create and disseminate aviation-related weather products (e.g., SIGnificant METeorological Information (SIGMETS), Terminal Aerodrome Forecasts (TAF), etc.) to the FAA and nearby NWS Weather Forecast Offices. The NWS uses various methods to disseminate these products (e.g., Commercial Communications Service Provider (CCSP), internet, NWS-to-FAA telecommunications gateways, etc) to the FAA.

Next Generation Weather Radar

The Next Generation Weather Radar (NEXRAD) system is a tri-agency (FAA, DoD, & NWS) Doppler weather radar to identify and track heavy precipitation and thunderstorm attribute information such as high wind velocity, hail, tornado, wind shear, precipitation intensity, and echo tops products. Mosaics of multiple NEXRADs are provided to FAA controllers on

DSR (from WARP) and to DoD controllers on MicroEARTS (where they control aircraft NAS airspace). NEXRAD mosaics are also sent to traffic managers. Commercial weather vendors also recieve NEXRAD products.

Next Generation Weather Radar Open System

The Next Generation Weather Radar Open System (NEXRAD Open System) mechanism will upgrade the NEXRAD to an open systems architecture with new hardware, software, and modular configuration. The upgrade will initially increase the radar""'s processing capabilities. Subsequent upgrades to the actual radar will reflect radar control via software that enables quicker, tailored scans resulting in more accurate products and improvement to overall system reliability and maintainability.

Notices-to-Airmen (NOTAMs) Distribution System

The Notices-to-Airmen (NOTAMs) Distribution System provides a centralized distribution capability to over 600 facilities, using dedicated telecommunications. Initially it provides Federal Contract Tower (FCT) users with a web query capability for Domestic and Flight Data Center (FDC) NOTAMs. It disseminates NOTAMs directly, with acknowledgement capability, to Air Traffic Control Tower (ATCT), Terminal Radar Approach Control (TRACON), Automated Flight Service Station (AFSS), and Air Route Traffic Control Center (ARTCC) facilities, from the US NOTAM System master database. It will also provide geographic parsing of ATCT/TRACON Domestic NOTAMs with the capability to receive acknowledgements.

Operational Telephone System

The Operational Telephone System (OTS) is a telecommunications conferencing system that provides voice connectivity, switching, and teleconferencing capabilities for Traffic Management Specialist (TMS) and the NAS Operations Manager (NOM), at the FAA Air Traffic Control System Command Center (ATCSCC) in Herdon, VA. The OTS interfaces with field facilities traffic management units (TMUs), the Severe Weather Group at Air Route Traffic Control Centers (ARTCCs), key FAA Regional Offices, FAA Headquarters, and the general aviation community including Airline Operations Centers (AOCs).

Operational and Supportability Implementation System (key system)

Operational and Supportability Implementation System (OASIS): The capabilities provided by the OASIS include alphanumeric and graphic weather product acquisition and display, flight plan processing, search and rescue services, and law enforcement support. The OASIS provides a real-time, multi-user, computer-based system that provides current weather information, forecast weather information, Notice to Airmen (NOTAM) information, and flight planning.

OASIS also supports flight service specialists at International Automated Flight Service Stations (IAFSS) that provide services associated with aircraft transiting the oceans.

Operational and Supportability Implementation System - Work Station

The Operational and Supportability Implementation System - Work Station (OASIS W/S) is a Windows-based PC located at each specialist position. It includes COTS software applications to provide the AFSS specialist with an integrated view of flight, alphanumeric, and graphic weather data. Pre-Flight and in-flight service functions are also available from these workstations.

Peripheral Adapter Module Replacement Item

The Peripheral Adapter Module Replacement Item (PAMRI) is an interface peripheral to the HOCSR. It provides a conduit through which the HOCSR receives and exchanges data, primarily radar data, flight data and interfacility data. The PAMRI converts communication protocols and translates data formats so the Host and EDARC can communicate with external devices.

Power Systems

The Power Systems (Pwr Sys) mechanism provides for the conditioning of commercial power, including uninterruptible power systems (UPS), to eliminate voltage dropouts, surges, and voltage sags caused by sources outside the facility. Power distribution, grounding, bonding and shielding of electrical system within the facility is also part of the Pwr Sys.

The Power Systems (Pwr Sys) mechanism provides the following: 1.) ACEPS Busway Replacements, 2.) ACEPS EG Maintenance, 3.) ACEPS Monitoring & Diagnostics, 4.) ACEPS Fuel System Upgrade, 5.) ACEPS Training, 6.) Battery Monitoring, 7.) Training Facility, 8.) CPDS, 9.) Battery Replacements, 10.) DC Systems, 11.) EG, 12.) LPGBS, 13.) Power Cable, 14.) UPS, 15.) Contract Support.

Radio Control Equipment

Radio Control Equipment (RCE), located at both ATC facilities and remote communication sites, control the operation of remotely located ground to air Very High Frequency/Ultra High Frequency (VHF/UHF) radios used by air traffic controllers to communicate with pilots. RCE interfaces with the voice switch at the ATC facility, telephone landlines, and ground to air radios at the En Route Remote Communications Air/Ground (RCAG) sites, Terminal Remote Transmitter/Receiver (RTR) sites, and Flight Service Station Remote Communications Outlet (RCO) sites.

Rapid Deployment Voice Switch Type I

The Rapid Deployment Voice Switch Type I (RDVS I) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS I (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the RDVS I. The RDVS I (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the RDVS I.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS I systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Rapid Deployment Voice Switch Type II

The Rapid Deployment Voice Switch Type II (RDVS II) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS II (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the RDVS II. The RDVS II (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the RDVS II.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS II systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Rapid Deployment Voice Switch Type IIA

The Rapid Deployment Voice Switch Type IIA (RDVS IIA) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS IIA (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. The RDVS IIA also supports air-to-ground (A/G) radio connectivity between ATCT controllers and pilots. The RDVS IIA (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between TRACON controllers and pilots is also supported by the RDVS IIA.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS IIA systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Remote Maintenance Monitoring Subsystem

Hardware and software components comprising a subsystem of the NAS infrastructure management system. RMMS monitors system performance to detect alarm or alert conditions and transmits appropriate messages to the maintenance processor system/subsystem (MPS). RMMS initiates diagnostics tests and adjusts/changes system parameters or configurations when properly commanded. There are approximately 5,000 RMMS in service.

Satellite Communication Ground Radios

Satellite Communications (SATCOM) Ground Radios are transceivers installed at oceanic and en route facilities to support an alternative means of tactical air traffic control (ATC) voice communications between ground controllers and pilots in aircraft. These transceivers are typically used in transoceanic applications. These transceivers are also installed at regional facilities and used as an alternate means of communications in case of total ground communications failure or between locations in mountainous terrain or where other means of communications are not possible (e.g., Alaska).

Oceanic air to ground satellite communications are provided via a communications service provider. The FAA currently has no plans to develop or implement its own air to ground SATCOM ground radios.

Satellite Telecommunications Data Link

Oceanic Centers use Satellite Telecommunications Data Link (SATCOM DL) mechanism transfer data between ground stations and aircraft. The FAA contracts for the satellite communications services and uses FANS-1A applications in the Oceanic automation system.

The FAA has no plans to develop its own SATCOM air to ground communications system.

Severe Weather Avoidance Program Enhancements

The Severe Weather Avoidance Program Enhancements (SWAP Enhancements) mechanism provides the initial severe weather rerouting planning capability. It also provides the weather specialists in the Air Traffic Control System Command Center (ATCSCC) with an automated tool that provides suggested reroutes around severe weather.

Small Tower Voice Switch

The Small Tower Voice Switch (STVS) is installed in small Airport Traffic Control Towers (ATCT) and in Flight Service Stations (FSS). The basic STVS has four operator positions. The STVS provides the Air Traffic Control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and Air Route Traffic Control Center (ARTCC) controllers/ Terminal Radar Approach Control (TRACON) controllers/FSS specialists/air traffic control system command center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the STVS. The STVS (installed in the FSS) provides the ATC operational G/G voice communications interconnectivity between specialists within an FSS (intercom), interconnectivity between specialists in separate FSSs (interphone), and interconnectivity between FSS specialists and Air Route Traffic Control Center (ARTCC) controllers/Terminal Radar Approach Control (TRACON) controllers/ATCT controllers/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground radio connectivity between FSS specialists and pilots is also supported by the STVS.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate STVS systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Special Use Airspace Management System

The Special Use Airspace Management System (SAMS) is an automated system that supports integrated Special Use Airspace (SUA) schedule operations within the FAA and between the FAA and the DOD. The SAMS consists of the SAMS Central Facility (i.e., the SAMS Processor), located at the ATCSCC, and SAMS Workstations located at the ATCSCC, ARTCCs, Towers, TRACONs, and CERAPs. The SAMS Processor receives airspace schedule messages from the Military Airspace Management System (MAMS) Central Facility and transmits them to the SAMS Workstations. The SAMS Processor transmits airspace response messages to the MAMS.

Special Use Airspace Management System Upgrade 1

Special Use Airspace Management System Upgrade 1 (SAMS Up1) collects dynamic Special Use Airspace (SUA) status from the Air Route Traffic Control Centers (ARTCCs) and redistributes it for the Airline Operations Centers (AOCs) and Aircraft via Flight Information Service (FIS).

Standalone Weather Sensors

The Standalone Weather Sensors (SAWS) is a standalone general support system that provides a backup to ASOS for certain weather parameters at low-level activity (Level C) Air Traffic Control Towers that do not have weather observers. The SAWS system collects, processes, and displays weather data automatically, including wind speed, direction and gust; temperature: relative humidity; and barometric pressure.

Standard Terminal Automation Replacement System

The Standard Terminal Automation Replacement System (STARS) processes primary and secondary radar information to acquire and track data points to display aircraft position for controllers. STARS provides safety tools such as, conflict alert (CA), Mode C intruder (MCI), final monitoring aid (FMA), Minimum Safe Altitude Warning (MSAW), Converging Runway Display Aid (CARDA), and Controller Automated Spacing Aid (CASA). Also, STARS provides the capability to implement the following enhancements: improved radar processing, Global Positioning System (GPS) compatibility, adaptive routing, Center Terminal Radar Approach Control (TRACON) Automation System (CTAS), data link implementation, improved weather display, and better utilization of traffic management information.

Standard Terminal Automation Replacement System Early Display Configuration

The Standard Terminal Automation Replacement System, Early Display Configuration (STARS EDC) provides STARS workstations at a limited number of ARTS IIIA facilities to replace aging DEDS and provide validation of the STARS workstation design before the complete STARS is implemented. STARS EDC will include updates to ARTS software for life cycle maintenance, additional human-machine interface (HMI) requirements for both tower and Terminal Radar Approach Control (TRACON), and Automated Radar Terminal System Model IIIE (ARTS IIIE) human factors validation.

Standard Terminal Automation Replacement System Technological Refresh

The Standard Terminal Automation Replacement System Technological Refresh (STARS Tech Refresh) mechanism updates the STARS to replace obsolete hardware and installs STARS at older ARTS IIE and IIIE sites. STARS Tech Refresh will be deployed with Common ARTS functionality.

Standard Terminal Automation Replacement System Terminal Controller Workstation

The Standard Terminal Automation Replacement System Terminal Controller Workstation (STARS TCW) provides the interface between the Terminal Radar Approach Control (TRACON) controller and the STARS processing unit.

Terminal Doppler Weather Radar

The Terminal Doppler Weather Radar (TDWR) system detects hazardous weather conditions such as windshear, microbursts and gust fronts, tornadic winds, heavy precipitation, and thunderstorms at an airport. This weather information is provided to air traffic on displays at terminal facilities. The TDWR also provides a 10- and 20-minute prediction of gust front location/movement.

Terminal Doppler Weather Radar - Display

The Terminal Doppler Weather Radar Display (TDWR Display) is a graphical device, which displays integrated Low-Level Windshear Alert System and TDWR weather products for tower supervisors and traffic management coordinators. The display also provides 6 levels of precipitation intensity, gust fronts and predicted storm movement(s).

Terminal Doppler Weather Radar - Technical Refresh

The Terminal Doppler Weather Radar technical refresh mechanism funds needed upgrades to the TDWR system. Improvements included replacing the system processor, upgrades to scan tracking (to 360 degree vice sector scan) and Radar Product Generator, Backup Communications, Uninterruptible Power Supply (UPS), modifications to battery, and safety modifications for the antenna.

Terminal Doppler Weather Radar Service Life Extension Program

The Terminal Doppler Weather Radar Service Life Extension Program (TDWR SLEP) mechanism funds the service live extension efforts to continue operation of the TDWR system. Upgrades include new hardware and re-hosting software for the Digital Signal Processor (DSP), RDA (receiver replacement), replacing antenna motors and hardened elevation drive bullgear/bearings.

Tower Data Link System Refresh

The Tower Data Link System (TDLS) automates tower-generated information for transmission to aircraft via data link. TDLS interfaces with sources of local weather data and flight data and provides Pre-Departure Clearance (PDC) and Digital-Automatic Terminal Information System (D-ATIS). PDC helps tower clearance delivery specialists compose and deliver departure clearances. The information is then transmitted in text form via the Aircraft Communication and Reporting System (ACARS) to an ACARS- equipped aircraft for review and acknowledgment by the flight crew.

Incorporating Digital-ATIS (D-ATIS) into TDLS allows: (1) Real-time ATIS updates throughout the NAS (2) Text message printouts, vise hand written recordings (3) Pilots to receive destination ATIS information, prior to take-off. For example, receive ATL''s ATIS broadcast while sitting in ORD. This list is not all-inclusive.

U.S. Notice to Airmen System - Replacement

U.S. Notice to Airmen System - Replacement (USNS-R) system collects, processes, and maintains a processed Notice to Airmen (NOTAM) database consisting of all NOTAMs on domestic and foreign civilian and military facilities, services, procedures, etc., pertinent to National Airspace System (NAS) users and specialists; and an international (ICAO) NOTAM database exchanged with and accessible to international agencies. In addtion, GPS NOTAMs are maintained as well. The

USNS-R will distribute the processed NOTAM to the respective user via the Aeronautical Information System (AIS) and Weather Message Switching Center Replacement (WMSCR). The USNS-R replaces the current Consolidated NOTAM System (CNS) and consists of an enhanced processor and the NOTAM Workstation.

Ultra High Frequency Airborne Radios

The Ultra High Frequency Avionics (UHF Avionics) are analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225-400 MHz frequency band, which are multi-channel transceivers, installed in an airborne military platform. These airborne devices support the tactical two-way voice communications/ coordination between the military pilot in the military aircraft and the controller on the ground.

Ultra High Frequency Ground Radios

Ultra High Frequency (UHF) Ground Radios are analog UHF amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 Mhz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and flight service station domains.

Ultra High Frequency Ground Radios - Replacement

The Ultra High Frequency Ground Radios - Replacement (UHF Ground Radios - Repl) mechanism represents analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 MHz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and Flight Service Station domains.

Very High Frequency Airborne Radios

Very High Frequency (VHF) Airborne Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 Mhz frequency band which are multi-channel transceivers installed in an airborne platform (e.g., commercial, cargo, and general aviation aircraft). These airborne devices support the tactical two-way voice communications/coordination between the pilot in the aircraft and the controller on the ground.

Very High Frequency Data Link - 1 Avionics

Very High Frequency Data Link - 1 Avionics (VDL-1 Avionics) consist of airborne radios operating in the very high frequency (VHF) range that receive and transmit data using a low-speed, character-oriented protocol and Carrier Sense Multiple Access (CSMA). Employed for use with ACARS.

Very High Frequency Ground Radios

Very High Frequency (VHF) Ground Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 MHz frequency band which are single-channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the pilot in commercial, cargo, or general aviation aircraft in the oceanic, en route (i.e., ARTCC), terminal (i.e., TRACON/tower), and flight service station domains. Additionally, there are analog VHF frequency modulation (VHF - FM) radio devices operating in the 161 - 174 MHz frequency band that are multi-channel transceivers. These transceivers are used by flight inspection, aviation security, and airway facility specialists supporting local airport operations and maintenance or to perform their operational maintenance mission in support of the NAS. However, these same VHF-FM transceivers are also used to support the resolution of emergency situations or establish a level of voice command and control communications/coordination during disaster recovery.

Very High Frequency Omnidirectional Range

The Very High Frequency Omnidirectional Range (VOR) is a ground-based radio navigation aid that broadcasts azimuth information to aircraft. VORs broadcast on assigned channels and include the facility identification in Morse code for pilot monitoring and verification. Some VORs are capable of broadcasting weather information and supporting pilot-controller communcations although these capabilities are typically provided by other infrastructure systems. In addition to providing en route and terminal area azimuth guidance, VORs also support nonprecision instrument approach operations.

Currently, VORs are the primary radio navigation aid in the National Airspace System (NAS). They serve as the internationally designated standard short-distance radio navigation aid for air carrier and general aviation Instrument Flight Rules (IFR) operations.

VORs may be installed stand-alone or co-located with either a DME or TACAN system. When co-located the facility is typically referred to as a VOR/DME or VORTAC facility, respectively. This configuration allows pilots to determine their aircraft''s bearing and distance to a single location, i.e., fix.

With the advent of space-based navigation capabilities, a planned reduction in operational VORs will begin in approximately 2010. The reduction will result in a "backbone" minimum operational network (MON) that will support IFR operations at the busiest airports in the NAS while serving as a backup for space-based navigation.

Very High Frequency Omnidirectional Range Avionics

Very High Frequency Omnidirectional Range Avionics (VOR Avionics) receive, process, and display for the pilot the azimuth (bearing) to or from ground-based VOR transmitters.

Increasing numbers of aircraft are being equipped with GPS or WAAS avionics. However, since a reduced network of VOR stations is planned to continue in operation indefinitely as a backup to GPS, VOR avionics are expected to remain in service indefinitely in some aircraft.

Voice Switching and Control System

The Voice Switching and Control System (VSCS) is installed in the Air Route Traffic Control Center (ARTCC). The VSCS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The VSCS provides the Air Traffic Control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ARTCC (intercom), interconnectivity between controllers in separate ARTCCs (interphone), and interconnectivity between ARTCC controllers and Terminal Radar Approach Control (TRACON) controllers/Airport Traffic Control Tower (ATCT) controllers/Flight Service Station (FSS) specialists/Air Traffic Control

System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ARTCC controllers and pilots is also supported by the VSCS.

Voice Switching and Control System Modification (Control System Upgrade)

The VSCS control system upgrade (VCSU) is a replacement of the Tandem computers that perform the logical switching and control for the VSCS system. The replacement of Tandem computers is for all ARTCCs including three spares.

Voice Switching and Control System Training and Backup Switches

Voice Switching and Control System Training and Backup Switch (VTABS) was developed to meet AT requirements for a separate standalone VSCS Backup and Training System. VTABS can be configured as a 50-position switch with the capability to support air traffic operations in the event of VSCS failure, hardware and software maintenance or power loss.

Weather Message Switching Center Replacement (WMSCR) Sustain

The Weather Message Switching Center Replacement (WMSCR) sustainment activity will sustain the existing WMSCR functionality of distributing alphanumeric weather text and NOTAM products through a hardware and software upgrade program. This upgrade program will consist of Commercial-off-the-Shelf processors, physical disk drives, workstations, network routers, printer, operating system, High Order Language programming software, and other commercially available software packages.

Weather System Processor

The Weather System Processor (WSP) provides precipitation, windshear, microburst, and precipitation data at 39 terminal areas that require wind shear coverage but do not warrant a Terminal Doppler Weather Radar. WSP generates weather products (microburst detection, gust front detection, wind shift prediction, and precipitation detection and tracking) derived from additional processing of Airport Surveillance Radar-9 (ASR-9) weather data.

Weather Systems Processor (Technological Refresh)

The Weather Systems Processor (Technological Refresh) (WSP (Tech Refresh)) is a technological refresh of Commercial off-the-Shelf (COTS) equipment procured under the original Airport Surveillance Radar-Weather Systems Processor (ASR-WSP) program. WSP COTS equipment refresh cycle is expected every six (6) to seven (7) years to maintain operational condition of equipment.

Weather Systems Processor Display

The Weather System Processor Displays (WSP Display) are located in the Air Traffic Control Tower (ATCT) and Terminal Radar Approach Control (TRACON) facilities and provide a graphic display of airport maps, airport specific runways and provides runway specific weather product alarms and alerts of wind shear, microbursts, and heavy precip to air traffic controllers.

Weather and Radar Processor (WARP) Replacement

The Weather and Radar Processor (WARP) will undergo a hardware and software upgrade to receive, process, display, and disseminate enhanced weather products (i.e., forecasts of thunderstorms)from a variety of sensors to provide tailored weather information to Traffic Managers on briefing terminals and ETMS (TFM-M), En route controllers (DSR), as well as gridded weather data to automation systems (e.g., URET, DOTS+, ATOP, CTAS/TMA/DA, etc). It will provide enhanced forecasting tools to CWSU meteorologists, and enhances weather support to oceanic operations with various forecasts of turbulence, volcanic ash plumes, and thunderstorms in gridded format. It also provides a telecommunications upgrade to support emerging FAA Telecommunications Infrastructure (FTI) services; incorporate enhanced computer security features and provide an organic maintenance capability.

Weather and Radar Processor (Weather and Radar Processor) Stage 3

The Weather and Radar Processor (WARP) Stage 3 provides gridded forecast weather data via the Weather Information Network System (WINS) to User Request Evaluation Tool Core Capability Limited Deployment (URET/CCLD), Enhanced Traffic Management System (ETMS), Dynamic Ocean Tracking System - Plus (DOTS-Plus), Advanced Technologies and Oceanic Procedures (ATOP), and Operational and Supportability Implementation System (OASIS).

People

Airline Operations Center Dispatcher

The Airline Operations Center Dispatcher (AOC Dispatcher) is a major airline employee that enters bulk flight plan requests and works with FAA by revising schedules and providing flight cancellations based on FAA provided data (aggregate demand lists, arrival rates, and parameters for anticipated ground delays.)

Broadcast Position

A Broadcast Position performs the following activities: Compile, evaluate, record, and disseminate weather and flight information through broadcasts (Transcribed Weather Broadcast (TWEB), Pilot's Automatic Telephone Weather Answering Service (PATWAS), Tactical Information Broadcast Service (TIBS), Hazardous Inflight Weather Advisory Service (HIWAS)).

Clearance Delivery

A Clearance Delivery Controller performs the following activities: Operate communications equipment; process and forward flight plan information; issue clearances and ensure accuracy of pilot read back; assist tower cab in meeting situation objectives; operate tower equipment; utilize alphanumerics.

Flight Data Controller

A Flight Data Controller performs the following activities: Operate interphone; Assist Radar Associate Controller in managing flight progress strips; Receive/process and distribute flight progress strips; Ensure flight data processing equipment is operational; Request/receive and disseminate weather, NOTAM's, NAS status, traffic management, and Special Use Airspace status messages; Manually prepare flight progress strips when automation systems are not available; Enter flight data into computer; Forward flight data via computer; Assist facility/sector in meeting situation objectives.

Flight Service Specialist

A Flight Service Specialist performs the following activities:

* Provide services to aircraft in flight and during the pre-flight phase,

* Monitoring and restoration of NAVAID; Issuing local airport advisories,

* Relaying ATC clearances, advisories or requests,

* Issuing military flight advisory messages,

* Receiving and issuing NOTAMS,

* Assisting is search and rescue communication searches,

* Activating and closing flight plans,

* Making unscheduled broadcasts,

* Soliciting and issuing PIREPS,

* Presenting pilot weather briefings to airborne aircraft,

* Locating lost aircraft,

* Recording aircraft contacts,

* Providing weather advisories and flight plan services,

* Providing hazardous area reporting services, and

* Keeping airmen and weather information current.

Ground Controller

A Ground Controller performs the following activities: Ensure separation; Control vehicles as well as aircraft on movement areas other than active runways Initiate control instructions; Monitor and operate communications equipment; Utilize tower radar display(s); Utilize alphanumerics; Assist the tower associate controller with coordination; Scan tower cab environment; Ensure computer entries and strip marking are completed for instructions or clearances issued or received; Process and forward flight plan information; Perform any functions of the tower team which will assist in meeting situation objectives; Coordinate with local control for safe and efficient use of runways and movement areas.

Local Controller

A Local Controller performs the following activities: Ensure separation; Control active runways; Initiate control instructions; Monitor and operate communications equipment; Utilize tower radar display(s); Utilize alphanumerics; Assist the tower associate controller with coordination; Scan tower cab environment; Ensure computer entries and strip marking are completed for instructions or clearances issued or received; Process and forward flight plan information; Perform any functions of the tower team which will assist in meeting situation objectives; Coordinate with ground control for safe and efficient use of runways and movement areas.

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Preflight Position

A Preflight Position performs the following activities: Brief and translate to pilots current weather, NOTAMS, flow control restrictions; Apply VFR not recommended procedures.

Radar Associate Controller

A Radar Associate Controller performs the following activities: Ensure separation, initiate control instructions; operate interphones; Accept and initiate non-automated handoffs; and ensure radar controller is made aware of the actions; Assist the radar controller by accepting or initiating automated handoffs/pointouts which are necessary for the continued smooth operation of the sector, and ensure that the radar controller is made immediately aware of any action taken; Coordinate, including pointouts; Monitor radios when not performing higher priority duties; Scan flight progress strips; Correlate with radar data; Manage flight progress strips; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the radar controller when aware of those instructions.

Radar Controller

A Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate automated handoffs; Assist the radar associate controller with non-automated handoff actions when needed; Assist the radar associate controller in coordination when needed; Scan radar display; Correlate with flight progress strip information; Ensure computer entries are completed on instructions or clearances you issue or receive; Ensure strip marking is completed on instructions or clearances you issue or receive.

Traffic Management Specialist

Traffic Management Specialists perform the following activities: Balance air traffic demand with the airspace's capacity to maintain maximum and efficient utilization of the NAS; Coordinate and implement traffic management directives if needed for area of responsibility; Monitor and balance traffic flows within the area of responsibility in accordance with traffic management directives; Evaluate effectiveness of traffic management directives and make necessary adjustments; Document delay information.

Interfaces

Direct User Access Terminal Service — (Flight Data) → Flight Service Data Processing System

The DUATS service transmits and receives flight plan processing information to FSDPS via FSAS.

Direct User Access Terminal Service — (Weather Data) → Flight Service Data Processing System

The DUATS service transmits and receives current and forecast aviation weather information, Notice to Airmen information, and flight planning services.

Host Computer System / Oceanic Computer System Replacement ← (Data Communication) → Aeronautical Information

System Replacement
Model One Full Capacity ⇐ (Data Communication) ⇒ Aeronautical Information System Replacement
Operational and Supportability Implementation System ⇐ (Flight Data) ⇒ Direct User Access Terminal Service
The OASIS uses flight plan data from the DUAT service for search and rescue (SAR) activities, and will also exchange SAR related information.

Issues

none identified

Service Group Air Traffic Services
Service Flight Planning
Capability Flight Plan Support
Operational Improvement

Provide Full Flight Plan Constraint Evaluation with Feedback (101102)

Users' and service providers' receipt of the real-time and projected status of special use airspace promotes their ability to gain access to the area. All users and service providers receive the same level of NAS-wide information. General aviation and commercial operators receive the same level of support through in collaborative decision making. The increase in timely and accurate information lets users more predictably plan and fly the routing that meets their individual objectives.
01-Jun-2015 to 22-Apr-2022

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

All available constraint information that may impact the proposed route of flight has been incorporated into the En Route Automation Modernization, (ERAM) flight data management system. This includes information such as special use airspace status from Aeronautical Information Management, (AIM), SIGMETS from General Weather Proscessor, (GWP), infrastructure outages from the National Operations Control Center (NOCC), significant congestion events defined by strategic flow in Traffic Flow Management-Modernization, (TFM-M), standard operating procedures and letters of agreement from AIM, etc. This is to ensure that the converted Flight Plan, (FP), is flyable when entered into the system. This information is provided to all parties supporting the flight planning process- government provided support, airline dispatchers, third party flight planning support or the individual pilot via System Wide Information Management, (SWIM), and the Swim Management Unit, (SMU), through the internet or other automated flight planning tools. The information is available real-time and is provided in standard volumetric and time parameters to improve the ability for the end user to determine impact on individual routes of flight. The goal is for all information that could impact a flight to be readily and easily available via SWIM and that it be in a form that reduces the need for specialized interpretation by providing it in formats and products that pre-combine the information into complete and easily used packages.

Benefits

The incorporation of additional information from AIM into the flight plan support system and automatic checking with feedback allow the user to file profiles that more accurately reflect all known constraints in the NAS. This results in the flight as flown, more closely reflecting the filed FP improving strategic conformance monitoring by other agencies since the number of amendments are reduced. This also improves the predictability since more of the constraints are visible to the user increasing the confidence that the flight plan is the flight that can be flown. Implementation of the AIM and the incorporation of its information into the flight plan support automation also increases access since airspace that is available but whose status is unclear is inaccessible to the prudent planner. Finally by providing a fuller set of constraints the user can more easily develop flight plans which can help address off-nominal situations such as late departure, weather, etc. and mitigate the effects to overall schedules.

Systems

Aeronautical Information Management (key system)

The AIM system represents the evolution of the acquisition, storage, processing and dissemination of aeronautical information in the NAS. Aeronautical information is defined as any information concerning the establishment, condition, or change in any component (facility, service, or procedure of, of hazard) of the National Airspace System. Aeronautical information comes in two types a somewhat static type, and a more dynamic type. The static portion represents the aeronautical information baseline as a particular date, while the dynamic portion updates particular aspects of the static portion due to system impacts or events. The Static portion represents data that NAS automation systems and other users use to adapt their software to properly operate. The dynamic portion represents information typically contained in NOTAMs that indicate short-term changes to the static data.

Many NAS systems support the acquisition, generation, and dissemination of the static aeronautical information. Information of this type includes airspace structures, airways, locations of NAS facilities, inter-facility letters of agreement and memorandums of understanding, obstructions, standard procedures, airspace charts, etc.

Several NAS systems also support the acquisition, generation, processing, and dissemination of the dynamic aeronautical information. Information of this type includes, facility outages, runway closures, temporary flight restrictions, airspace constraints, SIGMETs, etc. This information must be disseminated to users and providers of air traffic services in a timely and efficient manner.

AIM will provide the central point for the dissemination of high quality, configuration controlled information to NAS systems, service providers and users of the NAS. AIM will disseminate data based on the Aeronautical Information Exchange Model (AIXM) protocols.

Aeronautical Information System Replacement

The Aeronautical Information System (AISR) is a web based replacement system for the obsolete, maintenance intensive, non-Year 2000 (Y2K) compliant Leased A and B service (LABS) GS-200 system. AISR provides a workstation to: (a) process flight plans (file, amend, cancel, store and transmit) including ICAO flight plans, (b) retrieve aeronautical weather from WMSCR, collectives and AIS, and (c) process Notice to Airmen (NOTAM) (collect and distribute). AIS uses FAA IP Routed Multi-user Net (FIRMNet) for access by 60+ flight data (FD) specialists in ARTCCs, 60+ in AFSSs, and 10+ in FAA Regional Offices (ROs). It uses Non-classified Internet Protocol Router Network (NIPRNet) for access by 60+ Military Base

Operations (MBOs), dedicated lines for access by 20+ Meteorological Weather Processing Centers and National Airspace Data Interchange Network (NADIN) Packet-Switched Network (PSN) for access to the Weather Message Switching Center Replacement (WMSCR). Alternate access is available via toll free service to a local service provider. The primary AIS server is located in the National Network Control Center (NNCC) Salt Lake City facility and the back-up server is located in Chantilli VA.

Military base operations uses AIS for flight plan input.

Aeronautical Telecommunication Network Air to Ground Router

The Aeronautical Telecommunications Network (ATN) Air to Ground Router (ATN A/G Router) provides air/ground data communication complying with International Civil Aviation Organization (ICAO) Annex 10 formats.

The ATN Program Office, AOS-900, entered into an agreement with the Japanese Civil Aviation Bureau (JCAB) on February 12, 1998. This agreement initiated trial and connectivity testing to implement ATN and the FAA owned ATS Message Handling System (AMHS) service to support the anticipated additional air traffic demands in the Asia/Pacific region. The FAA and JCAB successfully conducted connectivity and interoperability testing during 2001.

OKI Electric Industry Co. LTD (OKI) developed ATN router software for use by the JCAB air traffic control system. This unique and proprietary OKI software follows strict international aviation development guidelines and uses the Windows NT operating system. The FAA employed the OKI router software during successful compatibility and interoperability testing with JCAB in 2001 and it was found to meet all the desired technical and operational requirements. The FAA uses the OKI router software for the international data service component of ATN and if used in the U.S. will provide an economy of scale, operational efficiency, interoperability and commonality of equipment.

The FAA is required to obtain the software and support drivers in March 2003 to meet the integration and security processes needed for the initiation of the service with Japan. The agreement between the FAA and JCAB specifies the need to have the system deployed by August 2003 in order to initiate ATN service by March 2004.

Note: This router does not currently support NEXCOM, but could possibly be used as the ATN Backbone required in the future.

Air Traffic Operational Management System

The Air Traffic Operational Management System (ATOMS) collects and distributes real-time air traffic operational data and management information throughout the National Airspace System (NAS).

Air Traffic Services Interfacility Data Communications System

The Air Traffic Services Interfacility Data Communications System (AIDCS) provides ground-to-ground data link communications between U.S. Oceanic Air Traffic Control (ATC) centers and adjacent Flight Information Regions (FIRs). AIDCS is composed of a workstation processor and gateway router. The workstation serves as a translator between the National Airspace System (NAS) and the International Civil Aviation Organization (ICAO) formats for flight plans and coordination messages. The gateway router interfaces the workstation to the Oceanic Display and Planning System (ODAPS) Flight Data Processor and National Airspace Data Interchange Network II (NADIN II)/Aeronautical Fixed Telecommunications Network (AFTN).

Airline Operation Center Workstation

The Airline Operation Center Workstation (AOC Workstation) enables meteorologists and dispatchers to receive weather advisories (e.g. International SIGnificant METeorological Information {SIGMETS}, Convective SIGMETS, Non-convective SIGMETS) and other weather products from the National Weather Service and other government services through the FAA and/or commercial vendors. In the case of dispatchers, the workstation also provides for the exchange of information such as bulk flight plan requests, Facilitates coordination with the FAA to revise schedules and provide flight cancellations based on FAA-provided data, aggregate demand lists, arrival rates, and parameters for anticipated traffic management initiatives.

Alaskan National Airspace System Interfacility Communications System

Alaskan NAS Interfacility Communications System (ANICS) uses FAA-owned satellite earth stations and leased transponders on communications satellites to provide reliable telecommunication services. ANICS Phase I sites provide critical communications with 99.99% availability by using two sets of equipment and two satellites in parallel. ANICS Phase II sites will provide essential communications with 99.9% availability by using one set of equipment and one satellite. ANICS Phase II uses commercial off-the-shelf (COTS) equipment in a redundant configuration to provide high availability and reliability. Phase II sites are enclosed in radomes that protect the equipment and antenna from the weather. The ANICS equipment provides remote maintenance monitoring and control. The equipment is controlled and operated from the Network Operations Control Center (NOCC), centrally located in the Anchorage ARTCC.

Automated Flight Service Station Display

The Automated Flight Service Station Display (AFSSD) is a DOS-based workstation located at each specialist position. It provides alphanumeric text information of flight and NOTAM data in an un-integrated manner.

Automated Flight Service Station Facilities Sustainment

The Automated Flight Service Station (AFSS) Facilities Sustainment (AFSS Facilities Sustainment) program improves and modernizes all flight service facilities to ensure timely and efficient service as well as a safe working environment for flight service specialists, technicians and other personnel. This program provides support for ceilings, floors, walls, doors, electrical and power systems, fire alarm and detection systems, heating, ventilation and air conditioning systems, lightning protection, grounding, bonding, and shielding, parking lots, fencing, plumbing, and roofing.

Automated Lightning Detection and Reporting System - To be deleted

The Automated Lightning Detection and Reporting System (ALDARS) is a system that acquires lightning information and integrates that data into the appropriate ASOS/AWOS observation to report the occurrence of a thunderstorm. It is now operational at numerous AWOS sites and is expected to become operational in all FAA ASOS sites.

Automated Surface Observing System Pre-Planned Product Improvement

The Automated Surface Observing System P3I will improve the automated sensors performance. These include an ASOS processor upgrade, improved dew point sensor, ice-free wind sensor, enhanced precipitation identifier, and a 25,000-foot ceilometer.

Automated Weather Observing System/Automated Surface Observing System Data Acquisition System Tech Refresh

Automated Weather Observing System/Automated Surface Observing System Data Acquisition System Tech Refresh sustains the ADAS functionality by implementing minor hardware and software updates.

Commercial Communications Service Provider

Commercial Communications Service Provider (CCSP) is a commercial entity who provides communications services for a fee.

Commercial Weather Vendor

Commercial Weather Vendor is a company that provides weather products and information for a fee.

Communications Management System

The CMS Management and Control function performs tasks for overall management and control of all air/ground and ground/ground voice and data communications to support System Wide Information Management (SWIM). CMS will also incorporate a reconfiguration control function to support reconfigurable airspace assignments, data routing, and a digital recording for both voice and data.

The En Route Automation Modernization program has assumed the data recording function via the Standard Automation Platform, and the Digital Voice Recorder System performs the voice recording function. The CMS routing function is a data router that ensures transport of data communications among Air Traffic Control facilities and users of SWIM. Additionally, CMS integrates functionalities inherently provided by the voice switches, the voice recorders, and the ATN Router.

Controller Pilot Data Link Communications National Deployment

Planning for shutdown of CPDLC Build 1 at Miami ARTCC in FY05. Cease VDL-2 data link transmissions commencing October 1, 2004. Develop Disposal Plan and remove equipment during Q1/Q2 of FY05. Investigate viability of retaining a Build 1 system at WJHTC I2F laboratory for demonstration purposes.

Use residual FY05 funding for start-up of multi-year CPDLC national deployment program:

- $0.2M for disposal and software tie-off

- $2.8M for national program startup

- New CPDLC ground system will integrate with ERAM

- Initial functionality will be the 4 CPDLC Build 1 Services

- Key site in the December 2009 time frame

Corridor Integrated Weather System

The CIWS collects various data, then processes, generates, displays, and distributes convective (thunderstorm) weather products to traffic managers at ATCSCC, certain ARTCCs and large TRACONs, and some large airports. The CIWS receives weather data from multiple sensors (primarily radars) and distributes processed thunderstorm information to NAS traffic managers via the System Wide Information Management (SWIM). This system will consist of a hardware processor and associated displays to be used in the TRACON, ARTCC, and ATCSCC.

Digital Voice Recorder System

Provides modern digital voice recording devices used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

In Feburary 2004, the DVRS was upgraded with a 24-channel card, which replaced the 16-channel card. This minor upgrade, called DVR II, was not extended to the systems installed prior to February 2004.

Digital Voice Recorder System Replacement

The Digital Voice Recorder System Replacement (DVRS Replacement) is a modern digital system used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

Display System Replacement - R-position Technical Refresh

Display System Replacement R-position Technical Refresh (DSR R-posit Tech Refresh) replaces the processor and LAN infrastructure for the R-position in preparation for ERAM. The replacement display will provide full and equivalent functionality (flight and surveillance data) on both the primary and backup ERAM channels. The R-position display processor will have direct data exchange capability with each of the ERAM LAN attached processors, including the Surveillance Data Processor (SDP), Flight Data Processor (FDP), Conflict Probe Processor (CPP), Traffic Management Advisor (TMA), and Controller-Pilot Data Link Communications (CPDLC).

Display System Replacement Console Reconfiguration Monitor Replacement

Display System Replacement Console Reconfiguration Monitor Replacement (DSR CRMR) replaces the R-position cathode ray tube (CRT) with a 20 x 20-inch square flat panel liquid crystal displays (LCD). Replacement of the large CTR with a LCD will free up space in the rear of the DSR console for relocating Voice Switch Control System (VSCS) equipment. Relocating the VSCS Electronic Module (VEM) and the VSCS Training and Backup System (VTABS)--formerly known as VEM/PEM)--is part of this activity and will improve equipment efficiency, packaging and the productivity of maintenance personnel.

En Route Automation Modernization (key system)

The En Route Automation Modernization System (ERAM System) will replace the existing diverse but functionally unequal primary and backup channels (Host and DARC) with redundant, functionally equivalent primary and backup channels. The new primary and backup channels achieve identical full functionality by using highly reliable fault tolerant processing elements running identical software. A tertiary system with diverse software, and physical and electronic isolation from the ERAM primary and back-up systems, will be maintained as fall back until the functionality, reliability, and availability of ERAM is demonstrated in the field. A training subsystem with functionality identical to the operational system will permit training to be conducted in parallel with operations.

In the past decade, several functions (URET, CTAS, etc.) were implemented as outboard processors/processes to the Host. As ERAM evolves in successive builds, this functionality will be integrated into ERAM as described below.

ERAM''s enhanced FDP will accommodate flexible routing around congestion, weather, and restrictions and improve efficiency by providing improved traffic flows. The enhanced ERAM surveillance processing will accomodate a larger geographic coverage, increased quantity of radar inputs and, when available, integration of Automatic Dependent Surveillance Broadcast data. In addition ERAM will use the improved accuracy and information disseminated by the sensors using the All-purpose Structured EUROCONTROL Radar Information Exchange (ASTERIX) format.

ERAM will allow for improved performance of decision support tools such as the Enhanced Traffic Management System (ETMS). ERAM will also incorporate Center-terminal radar approach control automation system (CTAS) functions (descent advisor, timelines, load graphs, automated miles-in-trail, and the situation display) and multi-center metering using miles-in-trail or time-based scheduling and meter lists.

ERAM will employ an industry standard LAN-based system to improve the efficiency of integrating commercial-off-the-shelf solutions in the future. ERAM software will be developed using a common high-level language to increase the FAA''s access to market-based skills and lower the cost of development and lifecycle maintenance. ERAM''s design will enable future enhancements and maintenance of components without affecting operational availability and increased productivity from an integrated monitor and control capability.

En Route Communications Gateway

The En Route Communications Gateway (ECG) replaces PAMRI and provides a modernized LAN-based infrastructure capable of accommodating ERAM with minimal modifications. The PAMRI functions to be replaces include providing communications interfaces to external systems located in other ARTCCs, TRACONs, AFSSs, ATCSCC, NORAD, US Law Enforcement, US Customs, Military Base Operations, and international ACCs. Other interfaces include the FDIO Central Control Unit, which exchanges FDIO data with FAA and DOD facilities, and the NADIN Concentrator, which exchanges data through the NADIN PSN with the the M1FC via WMSCR. ECG increases the number of external interfaces to radars from 24 to 36. ECG provides internal interfaces between HCS and DARC (or EBUS) and between HCS and traffic flow processors such as ETMS and DSP. ECG includes a Monitor and Control subsystem and a display for monitoring up to two dozen radars--called the Random Access Plan Position Indicator (RAPPI).

The operational components of ECG consist of a front end processor (communications and surveillance interfaces), two gateway processors (internal connectivity to HCS and DARC/EBUS), and separate LANs that communicate between the front end and gateway processors on the primary channel and between the front end and gateway processors on the backup channel. The primary data path, consisting of the ECG primary gateway and the HCS, operate on separate hardware platforms. However, the backup data path, consisting of the ECG backup gateway and the EBUS, will operate on the same hardware platform--the ECG gateway platform. This processor, with both functions performed therein, is renamed to the Backup Interface Processor (BIP). In essence, a single processor operates on the backup channel, supporting both the ECG gateway function and the EBUS function. These two functions will remain, however, as two mechanisms in the NAS architecture.

Enhanced Terminal Voice Switch

The Enhanced Terminal Voice Switches (ETVS) are installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) facilities with more than four air traffic controller positions. The ETVS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The ETVS (installed in the ATCT) provides the ATC operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the ETVS.

The ETVS (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within a TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the ETVS.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate ETVS systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

FAA Data Display System

The FAADDS incorporates the functionality and products of separate legacy weather and information displays. Serving as both a tactical and strategic tool, FAADDS functionality and display can be tailored to support a variety of ATC positions such as Air Traffic Control, Traffic Manager, and FSS specialist.

FAA Telecommunications Infrastructure

The FAA Telecommunications Infrastructure (FTI) services will replace most FAA-owned and leased telecommunications systems/services and consolidate their functions under a single service provider. The FTI contract will provide services that will meet current and future telecommunications requirements while reducing operational cost.

FTI is implemented in two phases. Phase 1 focuses on establishing an Internet Protocol (IP) backbone among 27 sites that includes ARTCCs, ATCSCC, Volpe, Aeronautical Center, WJHTC, and the two NADIN NNCC''s. Its primary goal is to transition 25 major nodes from the LINCS network. Phase 2 transitions circuits from DMN, BWM, NADIN PSN, and any remaining LINCS circuits.

FTI is a 15-year contract beginning in FY 2002 and ending in FY 2017.

Flexible Voice Switch

Voice communications is the primary means of communications among ATC facilities and between an Air Traffic Control Specialist (ATCS) and a pilot. Voice switching provides the ATCS both G/G Interfacility/Intrafacility and A/G voice communications connectivity. The NAS Voice Switch (NVS) program will replace aging voice switches and their analog interfaces with modern digital voice switches consisting of digital interfaces. The Flexible Voice Switch will be the common platform and baseline voice switch for all NAS domains with modularity and scalability to meet communications connectivity requirements. Additionally, this switch will be expandable to accommodate growth capacity requirements and able to support NAS Modernization needs as described in various Operational Improvements.

Flight Data Input/Output

The Flight Data Input/Output (FDIO) system provides flight progress information for use by the Tower, Terminal Radar Approach Control (TRACON) and Air Route Traffic Control Center (ARTCC) controllers. The FDIO system allows Air Traffic Control (ATC) Specialists to input automated flight data, perform data manipulation, and print flight strips.

Flight Data Input/Output Modification (Technical Refresh)

The Flight Data Input/Output Modification (Technical Refresh) (FDIO Mod (Tech Refresh)) mechanism replaces components that are uneconomical to maintain in the system providing an interface between the air traffic controller (terminal or en route) and the center computer. FDIO provides flight plan data in printed form for Airport Traffic Control Tower (ATCT) and Terminal Radar Approach Control (TRACON) controllers.

Flight Data Management - Air Traffic Control System Command Center

The Flight Data Management for Air Traffic Control System Command Center (FDM -ATCSCC) provides the national control center portion of a fully distributed flight data processing capability, using the initial flight object, which includes existing flight plan information and trajectory and performance data (preferred routes, runways). Provides data management and data distribution within the ATCSCC facility.

Flight Data Processing 2000

The Flight Data Processing 2000 (FDP2000) system replaced the oceanic flight data processing capability provided by Offshore Computer System (OCS) at the Anchorage Air Route Traffic Control Center (ARTCC). FDP2000 provides new hardware and software with added capabilities. The added capabilities include winds aloft modeling for improved aircraft position extrapolation accuracy, and support of Air Traffic Services Inter-facility Data Communications Systems (AIDC) ground-to-ground data link with compatible Flight Information Regions (FIRs). The OCS software was re-hosted from the Hewlett-Packard (HP) 1000 platform to the HP 9000 platform. FDP2000 provides flight data to the Microprocessor-En Route Automated Radar Tracking System (Micro-EARTS) radar data processing system. FDP2000 also integrates the existing Controller Pilot Data Link Communications (CPDLC) functions for data link communications with Future Air Navigation System 1/A (FANS 1/A)-equipped aircraft.

Flight Object Management System - En Route

The FOMS is a component of the Standard Automation Platform (SAP). The FOMS processes flight data received from multiple sources via the System Wide Information Management (SWIM) Management Unit. The FOMS also receives track data from the Surveillance Data Processor and associates tracks with flight data, producing the flight object, which is published to SWIM for subscriber use. Flight plan support functionality includes end-to-end profile evaluation in all phases of flight and evaluation against static and dynamic constraints (terrain, obstacles, airspace restrictions, etc.). The FOMS supports flight planning up to 180 days prior to day of flight. A user can access the flight object from initial to closeout in the same manner. The FOMS provides end-to-end flight data management from preflight to post analysis. Ownership of the flight object begins and ends with Traffic Flow Management and transitions during the flight to clearance delivery, ramp, surface, departure, transition to cruise, cruise, transition to arrival, and ramp. Flight data management is based on trajectory, assigned volumes, and "necessary" route structure.

Flight Object Management System - Terminal

The FOMS is a component of the Standard Automation Platform (SAP). The FOMS processes flight data received from multiple sources via the System Wide Information Management (SWIM) Management Unit. The FOMS also receives track data from the Surveillance Data Processor (SDP) and associates tracks with flight data, producing the flight object, which is published to SWIM for subscriber use. Flight plan support functionality includes end-to-end profile evaluation in all phases of flight and evaluation against static and dynamic constraints (terrain, obstacles, airspace restrictions, etc.). The FOMS supports flight planning up to 180 days prior to day of flight. A user can access the flight object from initial to closeout in the same manner. The FOMS provides end-to-end flight data management from preflight to post analysis. Ownership of the flight object begins and ends with Traffic Flow Management and transitions during the flight to clearance delivery, ramp, surface, departure, transition to cruise, cruise, transition to arrival, and ramp. Flight data management is based on trajectory, assigned volumes, and "necessary" route structure.

Flight Plan Pre-Processor

The FPPP will permit airlines to submit trial plans for evaluation up to 24 hours in advance, as well as providing early intent FPs to improve the predictive accuracy of ETMS traffic flow models by providing more accurate routing data to ETMS earlier in the planning process. FPPP will also simulate a capability to accept flight plans to be filed, which will be forwarded to the respective NAS Host. This capability will permit the filing of flight plans to a single destination, instead of to the 20 NAS Host systems. FPPP is being developed as a significant step in a multi-phased approach aimed at providing airlines with analytical tools to support flight plan preprocessing.

Flight Service Automation System Power Conditioning System

The Flight Service Automation System Power Conditioning System (FSAS Pwr Cond Sys) provides power-conditioning systems for Flight Service Station (FSS) facilities.

General Weather Processor (key system)

The GWP collects, analyzes, tailors, displays, and distributes weather products. The GWP receives weather data from multiple sensors and distributes processed and tailored weather information via System Wide Information Management. The GWP provides a standard set of algorithms and access to data/products that convey current and future status of impacting weather to all National Airspace System services.

High Frequency Aeronautical Telecommunictions Network Data Link

The High Frequency Aeronautical Telecommunications Network Data Link (HF ATN DL) provides two-way digital data communications over HF radios using International Civil Aviation Organization (ICAO) - compliant ATN digital data link applications in the transoceanic domain.

The FAA has no plans to develop its own HF ATN Data Communications system.

High Frequency Airborne Radios

High Frequency (HF) Airborne Radios are analog (HF multi-channel radio transceivers operating in the 2 - 30 Mhz frequency band installed in airborne commercial, cargo, and military aircraft transiting the oceanic, en route, terminal, or flight service station airspace domains. These transceivers are typically used in transoceanic applications.

High Frequency Data Link

The High Frequency Data Link (HF Data Link) provides two-way low-speed analog data communications over HF radios. HF Data Link is provided by a communications service provider in the transoceanic domain.

High Frequency Ground Radios

High Frequency (HF) Ground Radios are analog HF radio devices operating in the 2 - 30 Mhz frequency band, which may be single channel transmitters and receivers or multi-channel transceivers. These radio devices are installed at oceanic and en route facilities and used to support tactical air traffic control (ATC) voice communications between a ground controller and a pilot in an aircraft in the oceanic domain. Additionally, these devices are also installed at regional facilities and used to support voice command and control communications /coordination in emergency or during disaster recovery situations occurring in the NAS.

Integrated Communications Switching System Type I

The Integrated Communications Switching System Type I (ICSS I) are installed at Airport Traffic Control Towers (ATCT), Terminal Radar Approach Control (TRACON) facilities, and Automated Flight Service Stations (AFSS).

The ICSS I (installed in the ATCT) provides the air traffic control (ATC) operational ground-ground voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/air traffic control system command center (ATCSCC) specialists. Ground-air radio connectivity between ATCT controllers and pilots is also supported by the ICSS I.

The ICSS I (installed in the TRACON) provides the ATC operational ground-ground voice communications interconnectivity between controllers within TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Ground-air radio connectivity between TRACON controllers and pilots is also supported by the ICSS I.

The ICSS I (installed in the AFSS) provides the ATC operational ground-ground voice communications interconnectivity between specialists within an AFSS (intercom), interconnectivity between specialists in separate AFSSs (interphone), and interconnectivity between Flight Service Station (FSS) specialists and Air Route Traffic Control Center (ARTCC) controllers/TRACON controllers/ATCT controllers/Air Traffic Control System Command Center (ATCSCC) specialists. Ground-air radio connectivity between AFSS specialists and pilots is also supported by the ICSS I.

Integrated Information Workstation - Build 1

IIW Build 1 will include the infrastructure and system interfaces to acquire, analyze, store, update, display, and manage the following information in an integrated manner: (1) National Airspace System (NAS) aeronautical, (2) airport environmental, (3) airborne and surface surveillance, (4) flight information, (5) weather information, and (6) NAS status. Build 1 will also replace its predecessor system, FAA Data Display System, as well as interface with the following systems in support of its mission: Flight Object Management, System Wide Information Management, Next Generation- Traffic Flow Management, Maintenance Management System, Unified Decision Management System, and Aeronautical Information Management.

Integrated Terminal Weather System Technological Refresh (TR)

The Integrated Terminal Weather System Technological Refresh (ITWS TR) provides a hardware/software upgrade for ITWS, enabling it to be sustained. Upgrades are implemented to the ITWS processor, the telecommunications module, with increases in RAM and the digital signal processor.

Interfacility Communications

The Interfacility Communications (Interfacility Comm) includes all ground-to-ground communications systems connecting FAA facilities.

Juneau Airport Wind System

Juneau Airport Wind System (JAWS) provides data intended for use by non-meteorologists. Wind data from JAWS will be directly fed to the JNU (Juneau) Air Traffic Control Tower (ATCT). It will also feed the JNU Automated Flight Service Station (AFSS), JNU National Weather Service (NWS), and the Anchorage Center (ZAN Air Route Traffic Control Center (ARTCC)). Wind data will be available to other Alaska aviation users such as Alaska Airlines and general aviation (GA) via the Internet.

Low-Density Radio Communications Link

The Low-Density Radio Communications Link (LDRCL) is an FAA owned Low-Density Radio Communications Link (LDRCL) satisfies short-haul, low-density communication requirements. It provides user access (via tail circuits) to a Radio Communications Link (RCL) site or connectivity between two operational facilities

Medium Intensity Airport Weather System

The Medium Intensity Airport Weather System (MIAWS) provides a real-time display of storm positions and estimated storm tracks using Weather Surveillance Radar Model 88D (WSR-88D), also referred to as NEXRAD. This information will be displayed at LLWAS-RS equipped airports (tower and Terminal Radar Approach Control (TRACON) facilities). MIAWS information will also be delivered to aircraft cockpits via the Terminal Weather Information for Pilots (TWIP) and airline dispatchers.

Multi-Mode Digital Radios

Multi-Mode Digital Radios (MDRs) are ground-based Very High Frequency (VHF) air-traffic-control radios that can operate in several configurations: 1) analog voice with 25kHz channel spacing; 2) analog voice with 8.33 kHz channel spacing; and 3) VHF Data Link (VDL) Mode-3 which consists of two-way digital voice and data communication.

National Airspace System Infrastructure Management System Phase 2 (key system)

National Airspace System Infrastructure Management System (NIMS) Phase 2 will enhance resource and enterprise management, by developing NAS customer and user interaction tools, and providing additional performance and cost trend analysis. The NIMS will provide status information to all NAS users in near real time via the System Wide Information Management (SWIM) system. NIMS Phase 2 will enhance NIMS Phase 1 by providing the tools to achieve the concept of NAS Infrastructure Management (NIM). This new approach to the operation and maintenance of the NAS infrastructure will incorporate a performance-based service management approach that is focused on achieving user and customer satisfaction and managing NAS infrastructure services. The key characteristics of the NIM concept are: 1. Consolidating expertise in control centers to provide rapid, effective response to customer needs, support centralized operational control, and gain efficiencies. 2. Centralized Remote Monitoring and Control of NAS infrastructure services and systems to provide efficient service delivery and systems management. 3. Nationwide Operations Planning to provide standardized field operations across the NAS to facilitate consistent interaction with customers. 4. Information Infrastructure to provide real-time information collection and distribution to provide common NAS performance metrics and cost accounting. 5. Performance Based Management to provide data for the prioritization of maintenance activities and investment decisions.

The NIMS Enterprise Management (EM) will monitor and control NAS subsystems, equipment, resources and the NIMS. An Enterprise Manager Suite, consisting of commercially available hardware and software components, is installed at each of the four Operations Control Centers. The NIMS Resource Manager (RM) will support all NIMS Resource Functions. The NIMS RM, consisting of commercially available hardware and software components, is installed at each of the four Operations Control Centers.

The NIMS Enterprise Manager will be integrated with the NIMS Resource Manager to provide, Automated Incident Ticketing, a Common Logging System, Real Time System Performance Monitoring, and a Centralized Logistics/Maintenance System.

National Airspace System Infrastructure Management System Phase 3 (key system)

National Airspace System Infrastructure Management System (NIMS) Phase 3 will enhance Phase 2 enterprise and resource management, by further developing NAS customer and user interaction tools, and provide additional performance and cost trend analysis.

The NIMS Enterprise Management (EM) will monitor and control NAS subsystems, equipment and resources. The NIMS will provide status information to all NAS users in near real time via the System Wide Information Management (SWIM) system. An Enterprise Manager Suite, consisting of commercially available hardware and software components, is installed at each of the four Operations Control Centers. The NIMS Resource Manager (RM) will support all NIMS Resource Functions. The NIMS RM, consisting of commercially available hardware and software components, is installed at each of the four Operations Control Centers.

The NIMS Enterprise Manager will be integrated with the NIMS Resource Manager to provide, Automated Incident Ticketing, a Common Logging System, Real Time System Performance Monitoring, and a Centralized Logistics/Maintenance System.

National Weather Service Telecommunications Gateway

The National Weather Service Telecommunications Gateway (NWSTG) is the primary data communications switching facility of the National Weather Service (NWS). The NWSTG provides national and global near real-time data exchange services using automated communication resources, transmitting a wide variety of environmental data types. The NWSTG operates around the clock to acquire, process observations, construct messages, and disseminate messages and files of observations, analysis, and forecast products. The NWSTG connects to the FAA"s FBWTG (at the ATCSCC) and is a major source of gridded weather data as well as aircraft weather observations (MDCRS).

National Weather Service Workstation

The National Weather Service Workstation (NWS Workstation) enables the Meteorologist to create and disseminate aviation-related weather products (e.g., SIGnificant METeorological Information (SIGMETS), Terminal Aerodrome Forecasts (TAF), etc.) to the FAA and nearby NWS Weather Forecast Offices. The NWS uses various methods to disseminate these products (e.g., Commercial Communications Service Provider (CCSP), internet, NWS-to-FAA telecommunications gateways, etc) to the FAA.

Next Generation Air/Ground Communication System Ground Network Interface / Radio Interface Unit Infrastructure

The Ground Network Infrastructure consists of the Ground Netwok Interface (GNI) and the Radio Interface Unit (RIU), which includes the hardware used at the control site (Air Route Traffic Control Center (ARTCC) or a Terminal Radar Approach Control (TRACON) facility), and the Radio Site, respectively.

The GNI multiplex and de-multiplex voice and data information between the control site and the radios. Whereas the RIU includes vocoders to translate analog voice signals to and from narrow band digital representations of voice.

Next Generation Weather Radar Open System

The Next Generation Weather Radar Open System (NEXRAD Open System) mechanism will upgrade the NEXRAD to an open systems architecture with new hardware, software, and modular configuration. The upgrade will initially increase the radar""s processing capabilities. Subsequent upgrades to the actual radar will reflect radar control via software that enables quicker, tailored scans resulting in more accurate products and improvement to overall system reliability and maintainability.

Next-Generation Air/Ground Communications System Cockpit Display Unit

The Next-Generation Air/Ground Communications System Cockpit Display Unit (NEXCOM CDU) displays NEXCOM messages in aircraft cockpit. This display may be a standalone device or may be part of a multifunction, switchable, display unit.

Next-Generation Air/Ground Communications System Communication Management Unit

The Next-Generation Air-Ground Communications System Communication Management Unit (NEXCOM CMU) is a device that routes data to and from the NEXCOM radios, and incoming data to the appropriate cockpit display. This may be a standalone unit, part of a multifunctional display (MFD) or it may be implemented as part of a Flight Management System

(FMS).

Operational and Supportability Implementation System

Operational and Supportability Implementation System (OASIS): The capabilities provided by the OASIS include alphanumeric and graphic weather product acquisition and display, flight plan processing, search and rescue services, and law enforcement support. The OASIS provides a real-time, multi-user, computer-based system that provides current weather information, forecast weather information, Notice to Airmen (NOTAM) information, and flight planning.

OASIS also supports flight service specialists at International Automated Flight Service Stations (IAFSS) that provide services associated with aircraft transiting the oceans.

Operational and Supportability Implementation System - Work Station

The Operational and Supportability Implementation System - Work Station (OASIS W/S) is a Windows-based PC located at each specialist position. It includes COTS software applications to provide the AFSS specialist with an integrated view of flight, alphanumeric, and graphic weather data. Pre-Flight and in-flight service functions are also available from these workstations.

Power Systems

The Power Systems (Pwr Sys) mechanism provides for the conditioning of commercial power, including uninterruptible power systems (UPS), to eliminate voltage dropouts, surges, and voltage sags caused by sources outside the facility. Power distribution, grounding, bonding and shielding of electrical system within the facility is also part of the Pwr Sys.

The Power Systems (Pwr Sys) mechanism provides the following: 1.) ACEPS Busway Replacements, 2.) ACEPS EG Maintenance, 3.) ACEPS Monitoring & Diagnostics, 4.) ACEPS Fuel System Upgrade, 5.) ACEPS Training, 6.) Battery Monitoring, 7.) Training Facility, 8.) CPDS, 9.) Battery Replacements, 10.) DC Systems, 11.) EG, 12.) LPGBS, 13.) Power Cable, 14.) UPS, 15.) Contract Support.

Remote Maintenance Monitoring Subsystem

Hardware and software components comprising a subsystem of the NAS infrastructure management system. RMMS monitors system performance to detect alarm or alert conditions and transmits appropriate messages to the maintenance processor system/subsystem (MPS). RMMS initiates diagnostics tests and adjusts/changes system parameters or configurations when properly commanded. There are approximately 5,000 RMMS in service.

Satellite Communication Ground Radios

Satellite Communications (SATCOM) Ground Radios are transceivers installed at oceanic and en route facilities to support an alternative means of tactical air traffic control (ATC) voice communications between ground controllers and pilots in aircraft. These transceivers are typically used in transoceanic applications. These transceivers are also installed at regional facilities and used as an alternate means of communications in case of total ground communications failure or between locations in mountainous terrain or where other means of communications are not possible (e.g., Alaska).

Oceanic air to ground satellite communications are provided via a communications service provider. The FAA currently has no plans to develop or implement its own air to ground SATCOM ground radios.

Satellite Telecommunications Data Link

Oceanic Centers use Satellite Telecommunications Data Link (SATCOM DL) mechanism transfer data between ground stations and aircraft. The FAA contracts for the satellite communications services and uses FANS-1A applications in the Oceanic automation system.

The FAA has no plans to develop its own SATCOM air to ground communications system.

Standalone Weather Sensors

The Standalone Weather Sensors (SAWS) is a standalone general support system that provides a backup to ASOS for certain weather parameters at low-level activity (Level C) Air Traffic Control Towers that do not have weather observers. The SAWS system collects, processes, and displays weather data automatically, including wind speed, direction and gust; temperature: relative humidity; and barometric pressure.

Standard Terminal Automation Replacement System

The Standard Terminal Automation Replacement System (STARS) processes primary and secondary radar information to acquire and track data points to display aircraft position for controllers. STARS provides safety tools such as, conflict alert (CA), Mode C intruder (MCI), final monitoring aid (FMA), Minimum Safe Altitude Warning (MSAW), Converging Runway Display Aid (CARDA), and Controller Automated Spacing Aid (CASA). Also, STARS provides the capability to implement the following enhancements: improved radar processing, Global Positioning System (GPS) compatibility, adaptive routing, Center Terminal Radar Approach Control (TRACON) Automation System (CTAS), data link implementation, improved weather display, and better utilization of traffic management information.

Standard Terminal Automation Replacement System Technological Refresh

The Standard Terminal Automation Replacement System Technological Refresh (STARS Tech Refresh) mechanism updates the STARS to replace obsolete hardware and installs STARS at older ARTS IIE and IIIE sites. STARS Tech Refresh will be deployed with Common ARTS functionality.

Standard Terminal Automation Replacement System Terminal Controller Workstation

The Standard Terminal Automation Replacement System Terminal Controller Workstation (STARS TCW) provides the interface between the Terminal Radar Approach Control (TRACON) controller and the STARS processing unit.

Standard Terminal Automation Replacement System at Offshore Facilities

The Standard Terminal Automation Replacement System at Offshore Facilities (STARS Offshore) will replace the Microprocessor-En Route Automated Radar Tracking System (MicroEARTS) radar processing system functionality and provide limited flight data processing. STARS provides the capability to implement the following enhancements: improved radar processing, Global Positioning System (GPS) compatibility, adaptive routing, Center Terminal Radar Approach Control (TRACON) Automation System (CTAS), data link implementation, improved weather display, and better utilization of traffic management information. This is a joint procurement with the U.S. Department of Defense (DoD) and will achieve a common baseline for the FAA and DoD systems. STARS Preplanned Product Improvements (P3I) will upgrade the capabilities of STARS.

System Wide Information Management Build 1A

SWIM provides for National Airspace System (NAS)-wide transport and sharing of information between the Federal

Aviation Administration and users. SWIM is a consistent and single point of entry for users to publish and subscribe to NAS data. SWIM provides context-sensitive information to NAS elements that require the information. SWIM replaces many single-focus networks, such as FIRMNet and CDMnet. This build will integrate Aeronautical, Weather, and NAS Resource Status information systems into the SWIM architecture. A SWIM Management Unit, at each facility, will support the sending (publishing) and receiving (subscribing) of data on SWIM and the SDN. A central SWIM Directory Management Unit will maintain a directory of data available for subscription and publication.

System Wide Information Management Build 1B

Build 1B provides all items in 1A, including more NAS information. This build integrates Flight and Surveillance Information systems into the SWIM architecture.

System Wide Information Management Build 2

SWIM Build 2 provides all items in both 1A and 1B, including air-ground network integration. Build 2 includes integration of SWIM with the Aeronautical Telecommunications Network, Next Generation Air/Ground Communications, Satellite Communications, Ground Based Transceivers, Traffic Information Service-Broadcast, and Flight Information Service-Broadcast.

Terminal Doppler Weather Radar Service Life Extension Program

The Terminal Doppler Weather Radar Service Life Extension Program (TDWR SLEP) mechanism funds the service live extension efforts to continue operation of the TDWR system. Upgrades include new hardware and re-hosting software for the Digital Signal Processor (DSP), RDA (receiver replacement), replacing antenna motors and hardened elevation drive bullgear/bearings.

Traffic Flow Management System Applications Upgrade (key system)

Traffic Flow Management System Applications Upgrade (TFM Applications Upgrade) will be an integrated system used by traffic management specialists and coordinators to track and predict traffic flows; analyze effects of ground or weather delays; evaluate alternative routing strategies; improve collaborative decision making among users; plan traffic flow patterns; and assess daily and long term traffic flow performance in the National Airspace System (NAS) to better balance capacity and demand requirements for all users. Using the current Enhanced Traffic Flow Management System (ETMS) functionality as a baseline, this mechanism will evolve to a new open systems software architecture. This new architecture is expected to lower the life cycle cost of software maintenance, the development/integration of existing and future functionality and capabilities, and interface to other domain automation systems. This upgrade will facilitate new functionality and integrate existing TFM standalone subsystems and prototypes such as POET, TM Log, ESIS, DSP, etc. and improve the human computer interface (HCI).

Ultra High Frequency Airborne Radios

The Ultra High Frequency Avionics (UHF Avionics) are analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225-400 MHz frequency band, which are multi-channel transceivers, installed in an airborne military platform. These airborne devices support the tactical two-way voice communications/ coordination between the military pilot in the military aircraft and the controller on the ground.

Ultra High Frequency Ground Radios - Replacement

The Ultra High Frequency Ground Radios - Replacement (UHF Ground Radios - Repl) mechanism represents analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 MHz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and Flight Service Station domains.

Unified Decision Management System

The Unified Decision Making System (UDMS) enhances the Collaborative Decision Making (CDM) process by enabling NAS users and the FAA to share flight schedules, planned traffic initiatives (e.g., Ground Delay Programs), advanced traffic flow predictions, and other NAS data electronically. UDMS upgrades the basic CDM functionality of the TFM-M system hub that connects to user-owned data networks. NAS users gain access to more sophisticated graphical and textual traffic flow predictions, as well as automated planning and analysis tools.

Very High Frequency Ground Radios

Very High Frequency (VHF) Ground Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 MHz frequency band which are single-channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the pilot in commercial, cargo, or general aviation aircraft in the oceanic, en route (i.e., ARTCC), terminal (i.e., TRACON/tower), and flight service station domains. Additionally, there are analog VHF frequency modulation (VHF - FM) radio devices operating in the 161 - 174 MHz frequency band that are multi-channel transceivers. These transceivers are used by flight inspection, aviation security, and airway facility specialists supporting local airport operations and maintenance or to perform their operational maintenance mission in support of the NAS. However, these same VHF-FM transceivers are also used to support the resolution of emergency situations or establish a level of voice command and control communications/coordination during disaster recovery.

Very High Frequency Multi-Mode Airborne Radios

Very High Frequency Multi-Mode Airborne Radios (VHF MM Airborne Radios) refers to an airborne radio operating in the very high frequency (VHF) range capable of operating in the following modes: (1)) analog voice (i.e., 25 kHz spacing for use in the United States and other similarly equipped countries); (2) VHF Digital Link Mode 2 (VDL Mode-2) (two-way digital data transmission); (3) VHF Digital Link Mode 3 (VDL Mode-3), (integrated two-way digital voice/data transmission); and (4) analog voice (i.e., 8.33 kHz spacing for use in Europe and other similarly equipped countries).

Very High Frequency Omnidirectional Range

The Very High Frequency Omnidirectional Range (VOR) is a ground-based radio navigation aid that broadcasts azimuth information to aircraft. VORs broadcast on assigned channels and include the facility identification in Morse code for pilot monitoring and verification. Some VORs are capable of broadcasting weather information and supporting pilot-controller communcations although these capabilities are typically provided by other infrastructure systems. In addition to providing en route and terminal area azimuth guidance, VORs also support nonprecision instrument approach operations.

Currently, VORs are the primary radio navigation aid in the National Airspace System (NAS). They serve as the internationally designated standard short-distance radio navigation aid for air carrier and general aviation Instrument Flight Rules (IFR) operations.

VORs may be installed stand-alone or co-located with either a DME or TACAN system. When co-located the facility is typically referred to as a VOR/DME or VORTAC facility, respectively. This configuration allows pilots to determine their aircraft''s bearing and distance to a single location, i.e., fix.

With the advent of space-based navigation capabilities, a planned reduction in operational VORs will begin in approximately 2010. The reduction will result in a "backbone" minimum operational network (MON) that will support IFR operations at the busiest airports in the NAS while serving as a backup for space-based navigation.

Very High Frequency Omnidirectional Range Avionics

Very High Frequency Omnidirectional Range Avionics (VOR Avionics) receive, process, and display for the pilot the azimuth (bearing) to or from ground-based VOR transmitters.

Increasing numbers of aircraft are being equipped with GPS or WAAS avionics. However, since a reduced network of VOR stations is planned to continue in operation indefinitely as a backup to GPS, VOR avionics are expected to remain in service indefinitely in some aircraft.

Weather Systems Processor (Technological Refresh)

The Weather Systems Processor (Technological Refresh) (WSP (Tech Refresh)) is a technological refresh of Commercial off-the-Shelf (COTS) equipment procured under the original Airport Surveillance Radar-Weather Systems Processor (ASR-WSP) program. WSP COTS equipment refresh cycle is expected every six (6) to seven (7) years to maintain operational condition of equipment.

Weather and Radar Processor (WARP) Replacement

The Weather and Radar Processor (WARP) will undergo a hardware and software upgrade to receive, process, display, and disseminate enhanced weather products (i.e., forecasts of thunderstorms)from a variety of sensors to provide tailored weather information to Traffic Managers on briefing terminals and ETMS (TFM-M), En route controllers (DSR), as well as gridded weather data to automation systems (e.g., URET, DOTS+, ATOP, CTAS/TMA/DA, etc). It will provide enhanced forecasting tools to CWSU meteorologists, and enhances weather support to oceanic operations with various forecasts of turbulence, volcanic ash plumes, and thunderstorms in gridded format. It also provides a telecommunications upgrade to support emerging FAA Telecommunications Infrastructure (FTI) services; incorporate enhanced computer security features and provide an organic maintenance capability.

Support Activities

AF Procedure Development for Full Flight Plan Constraint Evaluation with Feedback

Airway Facilities procedures document the way airway facility operations are to be executed. The introduction of new systems, or changes to existing systems results in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

AF Training for Full Flight Plan Constraint Evaluation with Feedback

Airway Facilities (AF) training is provided to AF workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AF Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

AT Procedure Development for Full Flight Plan Constraint Evaluation with Feedback

Air Traffic Procedures document air traffic services and how they are implemented. The introduction of new systems, or changes to existing systems, may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

AT Training for Full Flight Plan Constraint Evaluation with Feedback

Air Traffic (AT) training is provided to the AT workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AT Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

People

Airline Operations Center Dispatcher

The Airline Operations Center Dispatcher (AOC Dispatcher) is a major airline employee that enters bulk flight plan requests and works with FAA by revising schedules and providing flight cancellations based on FAA provided data (aggregate demand lists, arrival rates, and parameters for anticipated ground delays.)

Clearance Delivery

A Clearance Delivery Controller performs the following activities: Operate communications equipment; process and forward flight plan information; issue clearances and ensure accuracy of pilot read back; assist tower cab in meeting situation objectives; operate tower equipment; utilize alphanumerics.

Flight Service Specialist

A Flight Service Specialist performs the following activities:

* Provide services to aircraft in flight and during the pre-flight phase,

* Monitoring and restoration of NAVAID; Issuing local airport advisories,

* Relaying ATC clearances, advisories or requests,

* Issuing military flight advisory messages,

* Receiving and issuing NOTAMS,

* Assisting is search and rescue communication searches,

* Activating and closing flight plans,

* Making unscheduled broadcasts,

* Soliciting and issuing PIREPS,

* Presenting pilot weather briefings to airborne aircraft,

* Locating lost aircraft,

* Recording aircraft contacts,

* Providing weather advisories and flight plan services,

* Providing hazardous area reporting services, and

* Keeping airmen and weather information current.

Ground Controller

A Ground Controller performs the following activities: Ensure separation; Control vehicles as well as aircraft on movement areas other than active runways Initiate control instructions; Monitor and operate communications equipment; Utilize tower radar display(s); Utilize alphanumerics; Assist the tower associate controller with coordination; Scan tower cab environment; Ensure computer entries and strip marking are completed for instructions or clearances issued or received; Process and forward flight plan information; Perform any functions of the tower team which will assist in meeting situation objectives; Coordinate with local control for safe and efficient use of runways and movement areas.

Local Controller

A Local Controller performs the following activities: Ensure separation; Control active runways; Initiate control instructions; Monitor and operate communications equipment; Utilize tower radar display(s); Utilize alphanumerics; Assist the tower associate controller with coordination; Scan tower cab environment; Ensure computer entries and strip marking are completed for instructions or clearances issued or received; Process and forward flight plan information; Perform any functions of the tower team which will assist in meeting situation objectives; Coordinate with ground control for safe and efficient use of runways and movement areas.

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Preflight Position

A Preflight Position performs the following activities: Brief and translate to pilots current weather, NOTAMS, flow control restrictions; Apply VFR not recommended procedures.

Radar Associate Controller

A Radar Associate Controller performs the following activities: Ensure separation, initiate control instructions; operate interphones; Accept and initiate non-automated handoffs; and ensure radar controller is made aware of the actions; Assist the radar controller by accepting or initiating automated handoffs/pointouts which are necessary for the continued smooth operation of the sector, and ensure that the radar controller is made immediately aware of any action taken; Coordinate, including pointouts; Monitor radios when not performing higher priority duties; Scan flight progress strips; Correlate with radar data; Manage flight progress strips; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the radar controller when aware of those instructions.

Radar Controller

A Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate automated handoffs; Assist the radar associate controller with non-automated handoff actions when needed; Assist the radar associate controller in coordination when needed; Scan radar display; Correlate with flight progress strip information; Ensure computer entries are completed on instructions or clearances you issue or receive; Ensure strip marking is completed on instructions or clearances you issue or receive.

Traffic Management Specialist

Traffic Management Specialists perform the following activities: Balance air traffic demand with the airspace's capacity to maintain maximum and efficient utilization of the NAS; Coordinate and implement traffic management directives if needed for area of responsibility; Monitor and balance traffic flows within the area of responsibility in accordance with traffic management directives; Evaluate effectiveness of traffic management directives and make necessary adjustments; Document delay information.

Interfaces

National Airspace System Infrastructure Management System Phase 2 ⇐ (NAS Status Data) ⇒ National Airspace System Infrastructure Management System Phase 2

The NIMS master systems interfaces with the NIMS client systems to share files, monitor messages and allow communications between maintenance data terminals anywhere within the NIMS network.

National Airspace System Infrastructure Management System Phase 3 ⇐ (NAS Status Data) ⇒ National Airspace System Infrastructure Management System Phase 3

The NIMS master systems interfaces with The NIMS client systems to share files, monitor messages and allow communications between maintenance data terminals anywhere within the NIMS network.

Issues

· Need to have improved airspace management of SUA to achieve benefits · Need to have link between Strategic Flow and Flight Planning congestion constraints and/or flow initiatives to achieve benefits · Need to have NOTAMS/infrastructure initiatives linked from infrastructure management to AIM to achieve benefits

Operational Improvement

Provide Interactive Flight Planning from Anywhere (101103)

NAS users receive interactive feedback regarding proposed flight plans based on such current constraints as special use airspace, weather, en route congestion, NAS operations, and maintenance status. Flight plan evaluation improves traffic flow and the airlines' ability to exchange information and negotiate flight plan changes in near real-time ability. Access via SWIM, (System Wide Information Management), is available from the flight deck as easily as it is from any ground connection. This is the flight deck side of management by trajectory, and it increases everyone's ability to perform conformance monitoring. Since the flight plans now accurately reflect the NAS constraints only small tactical deviations are present in NAS; all other changes are developed and coordinated electronically. Finally, in the longer-term aspects of this step, iterative trial planning becomes automated using agents.

31-Jan-2016 to 01-Jan-2019

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

The Flight Object Management System, (FOMS), processing system allows the flight planner to enter the flight plan in iterative steps with feedback to the planner on conditions expected to be encountered. This can be done by the user directly via SWIM and the Swim Management Unit, (SMU),link to FOMS or with support via the Flight Advisory Service, (FAS). Once completed, any subsequent change in an existing constraint or a new constraint defined in AIM, (Aeronautical Information Management), or in the Unified Decision Management System, (UDMS), will cause notification via the SMU and SWIM to the user that the flight plan should be reviewed at the time of occurrence.

Access via SWIM is available from the flight deck via Communications Management System, (CMS), as easily as it is from any ground connection. The ability for users to negotiate adjustments to active flight plans electronically allows service providers other than the active controller to participate in and approve flight plan amendments. The active controller needs only to review the plan in the Standard Automation Platform, (SAP), and approve the plan changes with a tactical horizon.

The system will maintain multiple flight plans for an individual flight (based on the flight object) so that not only the flight converted plan is available but also additional preferences to be evaluated by the system if conditions related to the converted flight plan change and it is possible to clear the preference. All flight plans are treated as trajectories with protected volumes to allow greater use of variable separations and support not only military operations but also the operations of other vehicles such as Remotely Operated Aircraft, (ROAs) and Reusable Launch Vehicles, (RLVs).

Finally in the longer term aspects of this step the iterative trial planning becomes automated where the user and system objectives as expressed in Next Generation-Traffic Flow Management, (NG-TFM), are used together to have automation determine the best compromise profile to be cleared. This is presented to users and service provider for final approval. Preferences are maintained and periodic re-planning is conducted as initial conditions change.

Benefits

The continued evaluation with feedback on potential constraints decreases the likelihood that a change in conditions that might have previously gone unnoticed could result in a flight now being subjected to an environment beyond the capabilities of the pilot or equipment. The iterative planning, the feedback on changing constraints and the ability to maintain multiple profiles increases the likelihood that the flight as flown is more closely aligned with the flight as intended. Also all the functionality present in the flight plan evaluation is available from the flight deck. This allows the user to develop and submit amendments to the flight while in flight including changes to or adding profiles. This is the flight deck side of management by trajectory and increases the ability of all to perform conformance monitoring since only small tactical deviations will be present in NAS as all other changes are developed and coordinated electronically. By removing the controller from the active participation in the flight plan change requests and by requiring the controller to only review and improve the plan changes with a tactical horizon, the re-plans developed are closer to user objectives, the plan considers all downstream constraints including those that no longer exist such as airspace now available, the removal of these tasks and the increased certainty in the future allows controllers to accept and handle more aircraft. The ability of service provider other than the tactical controller to enter into flight planning with the flight deck also increases the ability to mange aircraft against available controller assets increasing the utilization and supports right-sizing of traffic assignments.

Systems

Aeronautical Information Management (key system)

The AIM system represents the evolution of the acquisition, storage, processing and dissemination of aeronautical information in the NAS. Aeronautical information is defined as any information concerning the establishment, condition, or change in any component (facility, service, or procedure of, of hazard) of the National Airspace System. Aeronautical information comes in two types a somewhat static type, and a more dynamic type. The static portion represents the aeronautical information baseline as a particular date, while the dynamic portion updates particular aspects of the static portion due to system impacts or events. The Static portion represents data that NAS automation systems and other users use to adapt their software to properly operate. The dynamic portion represents information typically contained in NOTAMs that indicate short-term changes to the static data.

Many NAS systems support the acquisition, generation, and dissemination of the static aeronautical information. Information of this type includes airspace structures, airways, locations of NAS facilities, inter-facility letters of agreement and memorandums of understanding, obstructions, standard procedures, airspace charts, etc.

Several NAS systems also support the acquisition, generation, processing, and dissemination of the dynamic aeronautical information. Information of this type includes, facility outages, runway closures, temporary flight restrictions, airspace constraints, SIGMETs, etc. This information must be disseminated to users and providers of air traffic services in a timely and efficient manner.

AIM will provide the central point for the dissemination of high quality, configuration controlled information to NAS systems, service providers and users of the NAS. AIM will disseminate data based on the Aeronautical Information Exchange Model (AIXM) protocols.

Communications Management System (key system)

The CMS Management and Control function performs tasks for overall management and control of all air/ground and ground/ground voice and data communications to support System Wide Information Management (SWIM). CMS will also incorporate a reconfiguration control function to support reconfigurable airspace assignments, data routing, and a digital recording for both voice and data.

The En Route Automation Modernization program has assumed the data recording function via the Standard Automation Platform, and the Digital Voice Recorder System performs the voice recording function. The CMS routing function is a data router that ensures transport of data communications among Air Traffic Control facilities and users of SWIM. Additionally, CMS integrates functionalities inherently provided by the voice switches, the voice recorders, and the ATN Router.

Digital Voice Recorder System

Provides modern digital voice recording devices used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

In Feburary 2004, the DVRS was upgraded with a 24-channel card, which replaced the 16-channel card. This minor upgrade, called DVR II, was not extended to the systems installed prior to February 2004.

Digital Voice Recorder System Replacement

The Digital Voice Recorder System Replacement (DVRS Replacement) is a modern digital system used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

Flight Data Input/Output

The Flight Data Input/Output (FDIO) system provides flight progress information for use by the Tower, Terminal Radar Approach Control (TRACON) and Air Route Traffic Control Center (ARTCC) controllers. The FDIO system allows Air Traffic Control (ATC) Specialists to input automated flight data, perform data manipulation, and print flight strips.

Flight Object Management System - En Route (key system)

The FOMS is a component of the Standard Automation Platform (SAP). The FOMS processes flight data received from multiple sources via the System Wide Information Management (SWIM) Management Unit. The FOMS also receives track data from the Surveillance Data Processor and associates tracks with flight data, producing the flight object, which is published to SWIM for subscriber use. Flight plan support functionality includes end-to-end profile evaluation in all phases of flight and evaluation against static and dynamic constraints (terrain, obstacles, airspace restrictions, etc.). The FOMS supports flight planning up to 180 days prior to day of flight. A user can access the flight object from initial to closeout in the same manner. The FOMS provides end-to-end flight data management from preflight to post analysis. Ownership of the flight object begins and ends with Traffic Flow Management and transitions during the flight to clearance delivery, ramp, surface, departure, transition to cruise, cruise, transition to arrival, and ramp. Flight data management is based on trajectory, assigned volumes, and "necessary" route structure.

Flight Object Management System - Terminal (key system)

The FOMS is a component of the Standard Automation Platform (SAP). The FOMS processes flight data received from multiple sources via the System Wide Information Management (SWIM) Management Unit. The FOMS also receives track data from the Surveillance Data Processor (SDP) and associates tracks with flight data, producing the flight object, which is published to SWIM for subscriber use. Flight plan support functionality includes end-to-end profile evaluation in all phases of flight and evaluation against static and dynamic constraints (terrain, obstacles, airspace restrictions, etc.). The FOMS supports flight planning up to 180 days prior to day of flight. A user can access the flight object from initial to closeout in the same manner. The FOMS provides end-to-end flight data management from preflight to post analysis. Ownership of the flight object begins and ends with Traffic Flow Management and transitions during the flight to clearance delivery, ramp, surface, departure, transition to cruise, cruise, transition to arrival, and ramp. Flight data management is based on trajectory, assigned volumes, and "necessary" route structure.

General Weather Processor (key system)

The GWP collects, analyzes, tailors, displays, and distributes weather products. The GWP receives weather data from multiple sensors and distributes processed and tailored weather information via System Wide Information Management. The GWP provides a standard set of algorithms and access to data/products that convey current and future status of impacting weather to all National Airspace System services.

Integrated Information Workstation - Build 1 (key system)

IIW Build 1 will include the infrastructure and system interfaces to acquire, analyze, store, update, display, and manage the following information in an integrated manner: (1) National Airspace System (NAS) aeronautical, (2) airport environmental, (3) airborne and surface surveillance, (4) flight information, (5) weather information, and (6) NAS status. Build 1 will also replace its predecessor system, FAA Data Display System, as well as interface with the following systems in support of its mission: Flight Object Management, System Wide Information Management, Next Generation- Traffic Flow Management, Maintenance Management System, Unified Decision Management System, and Aeronautical Information Management.

Next Generation Traffic Flow Management (key system)

The Next Generation Traffic Flow Management (NG-TFM) system provides an array of automation and data processing tools for Traffic Management Specialists (TMS) and Traffic Management Coordinators (TMC), as well as a gateway that enables NAS users to make changes in flight schedules based on planned traffic initiatives (e.g., Ground Delay Programs) and other NAS data. This enhanced decision support system provides increased information exchange between FAA service providers and NAS users. NG-TFM receives flight schedules from NAS users (e.g., air carriers) and combines these with weather data, NAS status data, and planned traffic initiatives to generate detailed graphical and textual traffic displays as far as 24 hours into the future on both national and local scales. Features include both pre-flight and post-flight analysis tools, flight data archiving, enhanced traffic displays, traffic strategy (one or more initiatives) automation, "what if" strategy analysis, and automated TFM training tools.

NG-TFM is comprised of five different software component systems and will include a hardware and operating system software tech refresh. The complete NG-TFM software package includes changes to support interfaces with the Flight Object Management System (FOMS) and System Wide Information Management (SWIM). When complete, this will establish a new NG-TFM system baseline.

Operational and Supportability Implementation System

Operational and Supportability Implementation System (OASIS): The capabilities provided by the OASIS include alphanumeric and graphic weather product acquisition and display, flight plan processing, search and rescue services, and law enforcement support. The OASIS provides a real-time, multi-user, computer-based system that provides current weather information, forecast weather information, Notice to Airmen (NOTAM) information, and flight planning.

OASIS also supports flight service specialists at International Automated Flight Service Stations (IAFSS) that provide services associated with aircraft transiting the oceans.

Power Systems

The Power Systems (Pwr Sys) mechanism provides for the conditioning of commercial power, including uninterruptible power systems (UPS), to eliminate voltage dropouts, surges, and voltage sags caused by sources outside the facility. Power distribution, grounding, bonding and shielding of electrical system within the facility is also part of the Pwr Sys.

The Power Systems (Pwr Sys) mechanism provides the following: 1.) ACEPS Busway Replacements, 2.) ACEPS EG Maintenance, 3.) ACEPS Monitoring & Diagnostics, 4.) ACEPS Fuel System Upgrade, 5.) ACEPS Training, 6.) Battery Monitoring, 7.) Training Facility, 8.) CPDS, 9.) Battery Replacements, 10.) DC Systems, 11.) EG, 12.) LPGBS, 13.) Power Cable, 14.) UPS, 15.) Contract Support.

Radio Control Equipment

Radio Control Equipment (RCE), located at both ATC facilities and remote communication sites, control the operation of remotely located ground to air Very High Frequency/Ultra High Frequency (VHF/UHF) radios used by air traffic controllers to communicate with pilots. RCE interfaces with the voice switch at the ATC facility, telephone landlines, and ground to air radios at the En Route Remote Communications Air/Ground (RCAG) sites, Terminal Remote Transmitter/Receiver (RTR) sites, and Flight Service Station Remote Communications Outlet (RCO) sites.

Remote Maintenance Monitoring Subsystem

Hardware and software components comprising a subsystem of the NAS infrastructure management system. RMMS monitors system performance to detect alarm or alert conditions and transmits appropriate messages to the maintenance processor system/subsystem (MPS). RMMS initiates diagnostics tests and adjusts/changes system parameters or configurations when properly commanded. There are approximately 5,000 RMMS in service.

Standard Automation Platform Convergence Phase 1 (key system)

The purpose of Standard Automation Platform Convergence Phase 1 (SAP Conv P1) is to reduce both procurement and recurring costs by standardizing and sharing as many hardware and software ATC Automation components as possible.

An engineering convergence task will begin in fiscal year 2005 and run through 2015. All components from each of the automation systems (STARS, ERAM, TFM, etc.) will be analyzed, and the "best of breed" and "core" components will be selected. SAP convergence will be performed in the following areas: (1) Hardware; (2) System Software (operating systems, Commercial-Off-The-Shelf tools, etc.); (3) ATC applications that can be shared across domains; (4) ATC applications that are unique to a domain; and (5) ATC system support tools that can be shared across domains (adaptation, data extraction or systems analysis recording, data reduction and analysis tools, etc.). Proven STARS and ERAM components will be slected, integrated into the SAP, and rigorously tested for replacing STARS and ERAM components at or near their end of service life.

Prototyping begun under Phase 1 will continue with SAP Conv P2. The results of both efforts will lead to refining the requirements to develop the SAP WS mechanism with SDP and FOMS applications.

Standard Terminal Automation Replacement System

The Standard Terminal Automation Replacement System (STARS) processes primary and secondary radar information to acquire and track data points to display aircraft position for controllers. STARS provides safety tools such as, conflict alert (CA), Mode C intruder (MCI), final monitoring aid (FMA), Minimum Safe Altitude Warning (MSAW), Converging Runway Display Aid (CARDA), and Controller Automated Spacing Aid (CASA). Also, STARS provides the capability to implement the following enhancements: improved radar processing, Global Positioning System (GPS) compatibility, adaptive routing, Center Terminal Radar Approach Control (TRACON) Automation System (CTAS), data link implementation, improved weather display, and better utilization of traffic management information.

Standard Terminal Automation Replacement System Terminal Controller Workstation

The Standard Terminal Automation Replacement System Terminal Controller Workstation (STARS TCW) provides the interface between the Terminal Radar Approach Control (TRACON) controller and the STARS processing unit.

System Wide Information Management Build 1B (key system)

Build 1B provides all items in 1A, including more NAS information. This build integrates Flight and Surveillance Information systems into the SWIM architecture.

Unified Decision Management System (key system)

The Unified Decision Making System (UDMS) enhances the Collaborative Decision Making (CDM) process by enabling NAS users and the FAA to share flight schedules, planned traffic initiatives (e.g., Ground Delay Programs), advanced traffic flow predictions, and other NAS data electronically. UDMS upgrades the basic CDM functionality of the TFM-M system hub that connects to user-owned data networks. NAS users gain access to more sophisticated graphical and textual traffic flow predictions, as well as automated planning and analysis tools.

Support Activities

FAA Adaptation for Provide Interactive Flight Planning from Anywhere

Many NAS systems incorporate parameters that are adjustable. This allows for the setting of system parameters to optimize performance at each particular site. When new systems that have adjustable parameters are introduced into the NAS, adaptation data must be developed for the system. Environmental and procedural changes may also result in the need to modify FAA Adaptation Data. Generally, adaptation will begin 12 months before IOC and continue until 12 months after IOC.

FAA Certification for Provide Interactive Flight Planning from Anywhere

FAA certification is an activity necessary to support people and systems in the delivery of NAS services. Avionics and associated systems are deemed to be critical to the safety of flight and must be certificated. In addition certain operators and service providers require to be certified such as pilots, dispatchers and others. Certification will generally begin 24 months prior to Initial Operating Capability, and be complete prior to receiving or giving service.

Non-FAA Pilot Training for Provide Interactive Flight Planning from Anywhere

Non-FAA Pilot Training is provided to educate pilots as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional pilot training. Training will generally begin 60 days prior to IOC and be complete within one year following Full Operating Capability.

Non-FAA Training for Provide Interactive Flight Planning from Anywhere

Non-FAA Training is provided to educate users and their workforces as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional pilot training. Training will generally begin 60 days prior to IOC and be complete within one year following Full Operating Capability.

People

Airline Operations Center Dispatcher

The Airline Operations Center Dispatcher (AOC Dispatcher) is a major airline employee that enters bulk flight plan requests and works with FAA by revising schedules and providing flight cancellations based on FAA provided data (aggregate demand lists, arrival rates, and parameters for anticipated ground delays.)

Flight Service Specialist

A Flight Service Specialist performs the following activities:

* Provide services to aircraft in flight and during the pre-flight phase,

* Monitoring and restoration of NAVAID; Issuing local airport advisories,

* Relaying ATC clearances, advisories or requests,

* Issuing military flight advisory messages,

* Receiving and issuing NOTAMS,

* Assisting is search and rescue communication searches,

* Activating and closing flight plans,

* Making unscheduled broadcasts,

* Soliciting and issuing PIREPS,

* Presenting pilot weather briefings to airborne aircraft,

* Locating lost aircraft,

* Recording aircraft contacts,

* Providing weather advisories and flight plan services,

* Providing hazardous area reporting services, and

* Keeping airmen and weather information current.

Ground Controller

A Ground Controller performs the following activities: Ensure separation; Control vehicles as well as aircraft on movement areas other than active runways Initiate control instructions; Monitor and operate communications equipment; Utilize tower radar display(s); Utilize alphanumerics; Assist the tower associate controller with coordination; Scan tower cab environment; Ensure computer entries and strip marking are completed for instructions or clearances issued or received; Process and forward flight plan information; Perform any functions of the tower team which will assist in meeting situation objectives; Coordinate with local control for safe and efficient use of runways and movement areas.

Local Controller

A Local Controller performs the following activities: Ensure separation; Control active runways; Initiate control instructions; Monitor and operate communications equipment; Utilize tower radar display(s); Utilize alphanumerics; Assist the tower associate controller with coordination; Scan tower cab environment; Ensure computer entries and strip marking are completed for instructions or clearances issued or received; Process and forward flight plan information; Perform any functions of the tower team which will assist in meeting situation objectives; Coordinate with ground control for safe and efficient use of runways and movement areas.

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Preflight Position

A Preflight Position performs the following activities: Brief and translate to pilots current weather, NOTAMS, flow control restrictions; Apply VFR not recommended procedures.

Radar Associate Controller

A Radar Associate Controller performs the following activities: Ensure separation, initiate control instructions; operate interphones; Accept and initiate non-automated handoffs; and ensure radar controller is made aware of the actions; Assist the radar controller by accepting or initiating automated handoffs/pointouts which are necessary for the continued smooth operation of the sector, and ensure that the radar controller is made immediately aware of any action taken; Coordinate, including pointouts; Monitor radios when not performing higher priority duties; Scan flight progress strips; Correlate with radar data; Manage flight progress strips; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the radar controller when aware of those instructions.

Radar Controller

A Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate automated handoffs; Assist the radar associate controller with non-automated handoff actions when needed; Assist the radar associate controller in coordination when needed; Scan radar display; Correlate with flight progress strip information; Ensure computer entries are completed on instructions or clearances you issue or receive; Ensure strip marking is completed on instructions or clearances you issue or receive.

Traffic Management Specialist

Traffic Management Specialists perform the following activities: Balance air traffic demand with the airspace's capacity to maintain maximum and efficient utilization of the NAS; Coordinate and implement traffic management directives if needed for area of responsibility; Monitor and balance traffic flows within the area of responsibility in accordance with traffic management directives; Evaluate effectiveness of traffic management directives and make necessary adjustments; Document delay information.

Interfaces

Aeronautical Information Management — (Data Communication) → Integrated Information Workstation - Build 1

AIM sends NOTAMS and other data to the IIW for display.

Aeronautical Information Management ← (NAS Status Data) → System Wide Information Management Build 1B

"AIM exchanges NAS Status data, including equipment status, airspace schedules and status, contingency routings, and RNP-RNAV routings, with other systems via SWIM.

Aeronautical Information Management — (Weather Data) → System Wide Information Management Build 1B

AIM provides PIREPS for distribution to NAS users via SWIM.

Communications Management System ← (Data Communication) → Communications Management System

Controllers in the same or different facilities communicate via CMS.

Communications Management System ← (Voice Communication) → Communications Management System

Controllers in the same or different facilities communicate via CMS.

Flight Object Management System - En Route ← (Data Communication) → Integrated Information Workstation - Build 1

FOMS sends traffic management decision support tool information to IIW. The IIW serves as the controller interface to the tools.

Flight Object Management System - En Route ← (Flight Data) → Next Generation Traffic Flow Management

FOMS and NG-TFM exchange flight data.

Flight Object Management System - Terminal ← (Data Communication) → Integrated Information Workstation - Build 1

FOMS sends traffic management decision support tool information to IIW. IIW serves as the controller interface to the tools.

Flight Object Management System - Terminal ← (Flight Data) → Next Generation Traffic Flow Management

FOMS and NG-TFM exchange flight data.

General Weather Processor — (Weather Data) → System Wide Information Management Build 1B

GWP provides weather data to SWIM for distribution to users.

Next Generation Traffic Flow Management — (NAS Status Data) → Communications Management System

NG-TFM determines the best use of NAS resources and directs CMS to reconfigure communication resources accordingly.

Next Generation Traffic Flow Management — (Data Communication) → Integrated Information Workstation - Build 1

NG-TFM provides traffic flow management data to the IIW for display to controllers.

Next Generation Traffic Flow Management ← (Data Communication) → System Wide Information Management Build 1B

NG-TFM exchanges strategic flow data via SWIM.

System Wide Information Management Build 1B — (Data Communication) → Communications Management System

Pilots can access data available on SWIM via radios and CMS.

System Wide Information Management Build 1B — (NAS Status Data) → Flight Object Management System - En Route

FOMS receives NAS status data via SWIM.

System Wide Information Management Build 1B — (Weather Data) → Flight Object Management System - En Route

FOMS receives weather products from GWP and other sources via SWIM.

System Wide Information Management Build 1B — (NAS Status Data) → Flight Object Management System - Terminal

FOMS receives NAS status data via SWIM.

System Wide Information Management Build 1B — (Weather Data) → Flight Object Management System - Terminal

FOMS receives weather products from GWP and other sources via SWIM.

System Wide Information Management Build 1B — (Flight Data) → Next Generation Traffic Flow Management

NG-TFM receives flight object data via SWIM.

System Wide Information Management Build 1B — (NAS Status Data) → Next Generation Traffic Flow Management

"NG-TFM receives NAS status data, including airspace changes and oceanic constraints, via SWIM.

System Wide Information Management Build 1B — (Weather Data) → Next Generation Traffic Flow Management

NG-TFM receives weather advisory data via SWIM.

System Wide Information Management Build 1B ← (Data Communication) → Unified Decision Management System

UDMS exchanges collaborative decision data via SWIM.

System Wide Information Management Build 1B — (Flight Data) → Unified Decision Management System

UDMS receives flight data via SWIM.

System Wide Information Management Build 1B — (NAS Status Data) → Unified Decision Management System

UDMS receives system status data via SWIM.

System Wide Information Management Build 1B — (Weather Data) → Unified Decision Management System

UDMS receives weather advisory data via SWIM.

Issues

· Need to develop a concept of use for data messaging that includes its role in separation assurance as well as/differentiating from delivery of other ATM services. · Separation Assurance need to develop changes in clearance delivery beyond tactical realm to achieve benefit · Incorporation of flight object provided information into Traffic Synchronization to acieveachieve benefits · Changes to Airspace Management to incorporate Scheduling and Management of Special Use into Flight Planning

Service Group Air Traffic Services

Service Infrastructure-Information Management Service

Capability Government-Agency Support

Operational Improvement

Current Government/Agency Support (109301)

The FAA provides information and coordination services and support to other federal and state government agencies. ATC supports DoD operations, law enforcement missions, forest fire-fighting operations, and state aviation managers. ATC implements temporary flight restrictions over geographic areas for specified events and supports natural disaster relief flights, medical emergency flights, and drug interdiction flights. The FAA disseminates all available information to the appropriate agencies during search and rescue operations and to the NTSB and other entities during incident and accident investigations.

31-Jul-2009 to 01-Jul-2018

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Government/agency support provides information and coordination services. The National Airspace System (NAS) supports Department of Defense (DoD) operations, law enforcement missions, government land management agencies, forest fire-fighting operations, and state aviation managers. Air Traffic Control (ATC) supports natural disaster relief flights, medical emergency flights, aerial forest fire-fighting and drug interdiction flights, while managing routine demand on the system, weather constraints, etc.

In support of other government agencies during search and rescue and accident investigations, the NAS will provide any and all information relating to incidents and accidents to the National Transportation Safety Board (NTSB).

ATC facilities coordinate with DoD air defense organizations to detect and identify unauthorized aircraft entering Air Defense Identification Zones or Defense Early Warning Identification Zones.

The NAS provides air traffic assistance to law enforcement agencies to support special aircraft operations such as in-flight identification, surveillance, interdiction, and pursuit activities.

The Army, Air Force, Navy, Marine Corps and Coast Guard conduct flight activities under their own control and operating regulations, subject to Federal Aviation Regulations (FAR) when operating in the NAS. DoD has been granted exemptions from the FAR when their unique operational conditions require it.

The Interior Department and the United States Department of Agriculture (USDA) are responsible for Federal Land Management. The airspace above these lands is used for navigation in the administration of the public lands. Some altitude restrictions are in place to protect natural wildlife refuge areas.

Natural disaster areas very often have Temporary Flight Restriction (TFR) areas designated to support of relief operations. This is designed to manage numerous relief flights into and out of the area and prevent unnecessary flights.

TFRs are also activated in co-operation with the National Forest Service to support aerial fire suppression operations and keep unnecessary aircraft outside the fire zone. State and local governments, through coordination with the FAA, can request implementation of TFRs over a geographic area for specified events, such as evacuation from a disaster area, train or aircraft accident, police activities, a major fire in city, etc.

Government agencies coordinate their airspace requests through the National Flight Data Center (NFDC), located in the Air Traffic Control System Command Center (ATCSCC), which issues Notices to Airmen (NOTAMs) and coordinates with affected en route centers.

This Government/agency support is provided by telephone. In the event of an emergency, the Command and Control Communications (C3) system provides a secure telephone connection between FAA centers and some other Federal agencies.

Benefits

Current operations are provided in the NAS.

Systems

Command and Control Communications (key system)

Emergency Command and Control Communications (C3) systems are defined as those means of communications that the FAA employs to direct management, operations, and reconstitution of the National Airspace System (NAS) in support of FAA, U.S. Department of Transportation (DOT), and Department of Defense (DOD) missions during national disasters or national security emergencies. The FAA maintains a variety of fixed-position, portable, and transportable C3 communications systems for use in support of emergency operations. Such C3 system includes: National Radio Communications System (NARACS), High Frequency/Single Side Band (HF/SSB), Defense Messaging System (DMS), Very High Frequency/Frequency Modulated (VHF/FM), Secure Telephone Equipment (STE), Secure Facsimile, satellite telephone network (AMSC), Automated Notification System (ANS), Secure Conferencing System (SCS), and the Communications Support Teams (CST). Command and Control Communications (C3), was previously called Recovery Communications (RCOM).

Leased Inter-facility National Airspace System Communication System

The Leased Inter-facility National Airspace System Communication System (LINCS) provides transmission channels of various industry-standard types between any specified end points, used to satisfy all FAA operational and some administrative telecommunication requirements.

System Wide Information Management Build 1A (key system)

SWIM provides for National Airspace System (NAS)-wide transport and sharing of information between the Federal Aviation Administration and users. SWIM is a consistent and single point of entry for users to publish and subscribe to NAS data. SWIM provides context-sensitive information to NAS elements that require the information. SWIM replaces many single-focus networks, such as FIRMNet and CDMnet. This build will integrate Aeronautical, Weather, and NAS Resource Status information systems into the SWIM architecture. A SWIM Management Unit, at each facility, will support the sending (publishing) and receiving (subscribing) of data on SWIM and the SDN. A central SWIM Directory Management Unit will maintain a directory of data available for subscription and publication.

System Wide Information Management Build 1B

Build 1B provides all items in 1A, including more NAS information. This build integrates Flight and Surveillance Information systems into the SWIM architecture.

System Wide Information Management Build 2

SWIM Build 2 provides all items in both 1A and 1B, including air-ground network integration. Build 2 includes integration of SWIM with the Aeronautical Telecommunications Network, Next Generation Air/Ground Communications, Satellite Communications, Ground Based Transceivers, Traffic Information Service-Broadcast, and Flight Information Service-Broadcast.

People

Flight Service Specialist

A Flight Service Specialist performs the following activities:

* Provide services to aircraft in flight and during the pre-flight phase,

* Monitoring and restoration of NAVAID; Issuing local airport advisories,

* Relaying ATC clearances, advisories or requests,

* Issuing military flight advisory messages,

* Receiving and issuing NOTAMS,

* Assisting is search and rescue communication searches,

* Activating and closing flight plans,

* Making unscheduled broadcasts,

* Soliciting and issuing PIREPS,

* Presenting pilot weather briefings to airborne aircraft,

* Locating lost aircraft,

* Recording aircraft contacts,

* Providing weather advisories and flight plan services,

* Providing hazardous area reporting services, and

* Keeping airmen and weather information current.

Radar Controller

A Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate automated handoffs; Assist the radar associate controller with non-automated handoff actions when needed; Assist the radar associate controller in coordination when needed; Scan radar display; Correlate with flight progress strip information; Ensure computer entries are completed on instructions or clearances you issue or receive; Ensure strip marking is completed on instructions or clearances you issue or receive.

Traffic Management Coordinators

Traffic Management Coordinators track and predict traffic flows, analyze ground delays, evaluate alternative routing strategies, and plan local traffic patterns at the local facility (ARTCC, TRACON, or Towers)

Traffic Management Specialist

Traffic Management Specialists perform the following activities: Balance air traffic demand with the airspace's capacity to maintain maximum and efficient utilization of the NAS; Coordinate and implement traffic management directives if needed for area of responsibility; Monitor and balance traffic flows within the area of responsibility in accordance with traffic management directives; Evaluate effectiveness of traffic management directives and make necessary adjustments;

Document delay information.

Interfaces

no interfaces

Issues

None

Service Group Air Traffic Services

Service Infrastructure-Information Management Service

Capability Government-Agency Support

Operational Improvement

Enhance Government/Agency Support (109302)

The FAA provides information and coordination services and support to other federal and state government agencies through System Wide Information Management (SWIM). ATC supports DoD operations, law enforcement missions, forest fire-fighting operations, and state aviation managers. ATC implements temporary flight restrictions over geographic areas for specified events and supports natural disaster relief flights, medical emergency flights, and drug interdiction flights. The FAA disseminates all available information to the appropriate agencies during search and rescue operations and to the NTSB and other entities during incident and accident investigations.

17-Dec-1903 to 17-Dec-2099

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Government/agency support for information and coordination services is automatically provided via System Wide Information Management (SWIM). This is the same information and services currently provided manual processes.

Government agencies electronically transmit their airspace requests to the National Flight Data Center, which coordinates with affected FAA en route centers.

In-flight identification and surveillance data is automatically transmitted to the Department of Defense (DoD), National Transportation Safety Board (NTSB), Customs, the Drug Enforcement Agency (DEA), the Transportation Security Administration (TSA), other law enforcement agencies, government land management agencies, and forest fire-fighting operations for interdiction, pursuit activities, and other special operations.

Temporary Flight Restrictions (TFRs) in graphical format are automatically transmitted to flight operation centers, law enforcement agencies, the National Forest Service, and State and local governments.

Benefits

Other Government agencies automatically receive needed NAS status information, removing the need for human intervention.

Systems

Command and Control Communications

Emergency Command and Control Communications (C3) systems are defined as those means of communications that the FAA employs to direct management, operations, and reconstitution of the National Airspace System (NAS) in support of FAA, U.S. Department of Transportation (DOT), and Department of Defense (DOD) missions during national disasters or national security emergencies. The FAA maintains a variety of fixed-position, portable, and transportable C3 communications systems for use in support of emergency operations. Such C3 system includes: National Radio Communications System (NARACS), High Frequency/Single Side Band (HF/SSB), Defense Messaging System (DMS), Very High Frequency/Frequency Modulated (VHF/FM), Secure Telephone Equipment (STE), Secure Facsimile, satellite telephone network (AMSC), Automated Notification System (ANS), Secure Conferencing System (SCS), and the Communications Support Teams (CST). Command and Control Communications (C3), was previously called Recovery Communications (RCOM).

System Wide Information Management Build 1A

SWIM provides for National Airspace System (NAS)-wide transport and sharing of information between the Federal Aviation Administration and users. SWIM is a consistent and single point of entry for users to publish and subscribe to NAS data. SWIM provides context-sensitive information to NAS elements that require the information. SWIM replaces many single-focus networks, such as FIRMNet and CDMnet. This build will integrate Aeronautical, Weather, and NAS Resource Status information systems into the SWIM architecture. A SWIM Management Unit, at each facility, will support the sending (publishing) and receiving (subscribing) of data on SWIM and the SDN. A central SWIM Directory Management Unit will maintain a directory of data available for subscription and publication.

System Wide Information Management Build 1B

Build 1B provides all items in 1A, including more NAS information. This build integrates Flight and Surveillance Information systems into the SWIM architecture.

System Wide Information Management Build 2

SWIM Build 2 provides all items in both 1A and 1B, including air-ground network integration. Build 2 includes integration of SWIM with the Aeronautical Telecommunications Network, Next Generation Air/Ground Communications, Satellite Communications, Ground Based Transceivers, Traffic Information Service-Broadcast, and Flight Information Service-Broadcast.

Support Activities

AT Procedure Development for Enhanced Government/Agency Support

Air Traffic Procedures document air traffic services and how they are implemented. The introduction of new systems, or changes to existing systems, may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

AT Training for Enhanced Government/Agency Support

Air Traffic (AT) training is provided to the AT workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AT

Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

Non-FAA Procedure Development for Enhanced Government/Agency Support

A number of NAS users document the way their activities are to be carried out. The introduction of new systems, or changes to existing systems may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development will generally begin once ATC procedures have been established and be complete by 90 days prior to Initial Operating Capability, in order to facilitate training.

Non-FAA Training for Enhanced Government/Agency Support

Non-FAA Training is provided to educate users and their workforces as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional pilot training. Training will generally begin 60 days prior to IOC and be complete within one year following Full Operating Capability.

People

Flight Service Specialist

A Flight Service Specialist performs the following activities:

* Provide services to aircraft in flight and during the pre-flight phase,

* Monitoring and restoration of NAVAID; Issuing local airport advisories,

* Relaying ATC clearances, advisories or requests,

* Issuing military flight advisory messages,

* Receiving and issuing NOTAMS,

* Assisting is search and rescue communication searches,

* Activating and closing flight plans,

* Making unscheduled broadcasts,

* Soliciting and issuing PIREPS,

* Presenting pilot weather briefings to airborne aircraft,

* Locating lost aircraft,

* Recording aircraft contacts,

* Providing weather advisories and flight plan services,

* Providing hazardous area reporting services, and

* Keeping airmen and weather information current.

Radar Controller

A Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate automated handoffs; Assist the radar associate controller with non-automated handoff actions when needed; Assist the radar associate controller in coordination when needed; Scan radar display; Correlate with flight progress strip information; Ensure computer entries are completed on instructions or clearances you issue or receive; Ensure strip marking is completed on instructions or clearances you issue or receive.

Traffic Management Coordinators

Traffic Management Coordinators track and predict traffic flows, analyze ground delays, evaluate alternative routing strategies, and plan local traffic patterns at the local facility (ARTCC, TRACON, or Towers)

Traffic Management Specialist

Traffic Management Specialists perform the following activities: Balance air traffic demand with the airspace's capacity to maintain maximum and efficient utilization of the NAS; Coordinate and implement traffic management directives if needed for area of responsibility; Monitor and balance traffic flows within the area of responsibility in accordance with traffic management directives; Evaluate effectiveness of traffic management directives and make necessary adjustments; Document delay information.

Interfaces

no interfaces

Issues

Security concerns (such as ensuring that only the intended recipient receives a message) will need to be addressed before this feature can be implemented.

Service Group Air Traffic Services
Service Infrastructure-Information Management Service
Capability Monitoring and Maintenance
Operational Improvement

Current Monitoring And Maintenance (109101)

Maintaining, operating, and managing the infrastructure requires a variety of planning, engineering, analysis, repair, and maintenance functions. It also encompasses monitoring status, real-time assessments, and implementation of systems in the NAS. Included are activities to monitor the NAS status, detect and isolate failures and outages, and perform corrective and preventive maintenance to ensure NAS operational readiness. While there are some systems that can be remotely monitored, the status of many assets is detected by periodic testing or through pilot/controller reports of loss of capability.
22-Apr-2008 to 22-Jan-2011

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

The National Airspace System (NAS) includes thousands of pieces of equipment that must be monitored and maintained at over 5,000 sites. The Remote Maintenance Monitoring System (RMMS) monitors system performance to detect alarm or alert conditions and transmits status messages to the Maintenance Processor System, a data processing system designed to monitor and control remote facilities. The RMMS initiates diagnostics tests and adjusts system parameters or configurations when properly commanded. RMMS is primarily a monitoring system, although it has some control capabilities allowing limited remote maintenance of some systems. RMMS is transitioning to the NAS Infrastructure Management System (NIMS), a primary component of the concept of NAS Infrastructure Management (NIM).

NIMS will provide three primary capability improvements over RMMS: improved monitoring (especially in providing the big picture view versus individual system information), the potential for improved remote maintenance (this functionality often must also be built into the system to be maintained), and improved information security. NIMS is being implemented using a phased approach. NIMS Phase 1, which has been completed, provided modern Commercial Off-the-Shelf (COTS) tools to implement service-based systems management. A COTS workforce management tool was installed in the NIMS Premier Facility in the Air Traffic Control System Command Center (ATCSCC) in Herndon, Virginia. The Enterprise Management (EM) System provides remote monitoring and control functionality to 3,700 NAS facilities and deployed 5,800 maintenance data terminals (MDT).

NIMS Phase 2 will provide automated support to several core operational functions. NIMS Phase 3 will build upon previous phases and include intelligent fault correlation, information sharing, and additional functionality tied to NAS technological improvements.

The FAA's national and international message and packet switching assets are monitored by two National Network Control Centers (NNCCs), one located in Atlanta, GA and the other in Salt Lake City, UT. Each NNCC domain covers approximately one-half of the country, however each can take over the entire country if major interruptions occur at the other NNCC. The FAA's non-packet switching assets are monitored as follows.

NAS infrastructure operations in the NIMS environment is a three-tiered hierarchy, consisting of a National Operations Control Center (NOCC) at the top tier, three Operations Control Centers (OCCs) at the second tier, and 30 Service Operations Centers (SOCs) and approximately 300 Work Centers (WCs) at the third tier. The NOCC is located at the ATCSCC in Herndon, Virginia. Under the NAS infrastructure operations in the NIM environment, the NOCC will be the top tier in a three-tier hierarchy. The NOCC coordinates operations from a national perspective and standardizes field operations across the NAS to help facilitate consistent interaction with customers.

OCCs are second tier in the NIM hierarchy. They function in a domain approximately one-third of the country in scope (including Alaska and offshore service areas). They provide coverage for all services, and have significant monitoring and control functions, with the exception of telecommunications. They coordinate with the NOCC. The three OCC locations are the Pacific OCC in San Diego, CA, the Mid-States OCC in Kansas City, KS, and the Atlantic OCC in Atlanta, GA.

SOCs and WCs are third tier in the NIM hierarchy. The SOC scope is limited to support of selected high NAS impact Air Traffic facilities such as Air Route Traffic Control Centers and selected high density Terminal Radar Approach Controls (TRACONs). SOCs cover all services, and have complete monitoring and control functions. The WCs' scope is limited to a specific geographic area. Some WCs service large geographic areas while others service only single high NAS impact facilities. They cover all services, and have local control functions. They coordinate with the assigned OCC or SOC.

Infrastructure management support for space transportation users is generally provided by the Department of Defense (DoD), the National Aeronautics and Space Administration (NASA), and commercial space transportation service providers. The FAA supports Kennedy Space Center (KSC) Space Shuttle launch and recovery missions by monitoring and maintaining KSC tactical air navigation (TACAN) facilities on a fee-for-service basis. Prior to a launch or recovery mission, FAA technicians perform a facility certification check and report any operational limitations that cannot be corrected on-site prior to the scheduled missions. FAA maintains the TACAN facilities in accordance with FAA/NASA agreements.

Benefits

Current operations are provided in the NAS.

Systems

Automated Radar Terminal System Software

Provides maintenace of the Automated Radar Terminal System Software (ARTS S/W) for ARTS IIE, ARTS IIIA and ARTS IIIE. Functions include radar data processing (RDP), Minimum Safe Altitude Warning (MSAW); controller automated spacing tool, Converging Runway Display Aid (CRDA), Final Approach Monitor (FMS), and other tools to assist the terminal and tower controllers to manage the air traffic in the terminal area.

Leased Inter-facility National Airspace System Communication System

The Leased Inter-facility National Airspace System Communication System (LINCS) provides transmission channels of various industry-standard types between any specified end points, used to satisfy all FAA operational and some administrative telecommunication requirements.

National Airspace System Infrastructure Management System Phase 1 (key system)

National Airspace System Infrastructure Management System (NIMS) Phase 1 will consist of the following: 1. Increase the effectiveness of the operation, management, and control of NAS services and facilities; 2. Ensure the appropriate NAS equipment assets will be available to provide the capacity needed to handle projected air traffic levels; 3. Analyze information to establish trends, design predictive adaptive maintenance actions, and reduce critical equipment outage situations and aircraft delays; 4. Create a common Airway Facility (AF) operational data repository for accessibility across the user community; 5. Ensure that the required services are delivered in an era of declining monetary and personnel resources; and, 6. Reduce the future costs of doing business through AF workload reductions while continuously maintaining reliable, effective, and efficient service.

National Airspace System Infrastructure Management System Phase 2 (key system)

National Airspace System Infrastructure Management System (NIMS) Phase 2 will enhance resource and enterprise management, by developing NAS customer and user interaction tools, and providing additional performance and cost trend analysis. The NIMS will provide status information to all NAS users in near real time via the System Wide Information Management (SWIM) system. NIMS Phase 2 will enhance NIMS Phase 1 by providing the tools to achieve the concept of NAS Infrastructure Management (NIM). This new approach to the operation and maintenance of the NAS infrastructure will incorporate a performance-based service management approach that is focused on achieving user and customer satisfaction and managing NAS infrastructure services. The key characteristics of the NIM concept are: 1. Consolidating expertise in control centers to provide rapid, effective response to customer needs, support centralized operational control, and gain efficiencies. 2. Centralized Remote Monitoring and Control of NAS infrastructure services and systems to provide efficient service delivery and systems management. 3. Nationwide Operations Planning to provide standardized field operations across the NAS to facilitate consistent interaction with customers. 4. Information Infrastructure to provide real-time information collection and distribution to provide common NAS performance metrics and cost accounting. 5. Performance Based Management to provide data for the prioritization of maintenance activities and investment decisions.

The NIMS Enterprise Management (EM) will monitor and control NAS subsystems, equipment, resources and the NIMS. An Enterprise Manager Suite, consisting of commercially available hardware and software components, is installed at each of the four Operations Control Centers. The NIMS Resource Manager (RM) will support all NIMS Resource Functions. The NIMS RM, consisting of commercially available hardware and software components, is installed at each of the four Operations Control Centers.

The NIMS Enterprise Manager will be integrated with the NIMS Resource Manager to provide, Automated Incident Ticketing, a Common Logging System, Real Time System Performance Monitoring, and a Centralized Logistics/Maintenance System.

National Airspace System Infrastructure Management System Phase 3 (key system)

National Airspace System Infrastructure Management System (NIMS) Phase 3 will enhance Phase 2 enterprise and resource management, by further developing NAS customer and user interaction tools, and provide additional performance and cost trend analysis.

The NIMS Enterprise Management (EM) will monitor and control NAS subsystems, equipment and resources. The NIMS will provide status information to all NAS users in near real time via the System Wide Information Management (SWIM) system. An Enterprise Manager Suite, consisting of commercially available hardware and software components, is installed at each of the four Operations Control Centers. The NIMS Resource Manager (RM) will support all NIMS Resource Functions. The NIMS RM, consisting of commercially available hardware and software components, is installed at each of the four Operations Control Centers.

The NIMS Enterprise Manager will be integrated with the NIMS Resource Manager to provide, Automated Incident Ticketing, a Common Logging System, Real Time System Performance Monitoring, and a Centralized Logistics/Maintenance System.

Remote Maintenance Monitoring Subsystem (key system)

Hardware and software components comprising a subsystem of the NAS infrastructure management system. RMMS monitors system performance to detect alarm or alert conditions and transmits appropriate messages to the maintenance processor system/subsystem (MPS). RMMS initiates diagnostics tests and adjusts/changes system parameters or configurations when properly commanded. There are approximately 5,000 RMMS in service.

System Wide Information Management Build 1A

SWIM provides for National Airspace System (NAS)-wide transport and sharing of information between the Federal Aviation Administration and users. SWIM is a consistent and single point of entry for users to publish and subscribe to NAS data. SWIM provides context-sensitive information to NAS elements that require the information. SWIM replaces many single-focus networks, such as FIRMNet and CDMnet. This build will integrate Aeronautical, Weather, and NAS Resource Status information systems into the SWIM architecture. A SWIM Management Unit, at each facility, will support the sending (publishing) and receiving (subscribing) of data on SWIM and the SDN. A central SWIM Directory Management Unit will maintain a directory of data available for subscription and publication.

People

Airway Facility Specialist

Airway Facilities specialists are responsible for the certification and maintenance of FAA systems in facilities. The number and types of specialists depend on the number of systems under AF's responsibility. The major categories of specialties for AF personnel include automation, radar, navigation, communication, telecommunications, and environmental. Due to the quantity and complexity of systems within a facility, specialists focus on well-defined and specific areas of responsibilities.

Interfaces

National Airspace System Infrastructure Management System Phase 1 ⇐ (NAS Status Data) ⇒ National Airspace System Infrastructure Management System Phase 1

The NIMS master systems interfaces with the NIMS client systems to share files, monitor messages and allow communications between maintenance data terminals anywhere within the NIMS network.

National Airspace System Infrastructure Management System Phase 2 ⇐ (NAS Status Data) ⇒ National Airspace System Infrastructure Management System Phase 2

The NIMS master systems interfaces with the NIMS client systems to share files, monitor messages and allow communications between maintenance data terminals anywhere within the NIMS network.

National Airspace System Infrastructure Management System Phase 3 ← (NAS Status Data) → National Airspace System Infrastructure Management System Phase 3

The NIMS master systems interfaces with The NIMS client systems to share files, monitor messages and allow communications between maintenance data terminals anywhere within the NIMS network.

Issues

None

Service Group Air Traffic Services

Service Infrastructure-Information Management Service

Capability Monitoring and Maintenance

Operational Improvement

Increase Remote Monitoring and Maintenance (109102)

Additional capabilities provide Airways Facilities personnel A) a top-down view of a problem from a larger perspective (including the Operations Control Center [OCC] and the National Operations Control Center [NOCC]) instead of only the local view, B) increased remote maintenance, and C) intelligent automatic fault correction.

17-Dec-1903 to 17-Dec-2099

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

National Airspace System (NAS) Infrastructure Management System (NIMS) Phase 2 will provide automated support to three core operational functions when completed. These functions are: 1) Support and coordinate maintenance activities including the functional processes related to conducting operations and maintenance (O&M) activities on the NAS infrastructure such as coordinating scheduled maintenance activities. 2) Perform Remote Maintenance and Monitoring (RMM) including the policies and processes for conducting RMM in the NAS Infrastructure Management (NIM) environment. Initially, these processes will address capabilities that are available through the existing RMMS. Following are the high-level RMM functional sub-processes:

A) Remote maintenance, including periodic maintenance and remote certification of equipment and services; B) Remote status monitoring of equipment or service including monitoring of parameter values and alarms; and C) Remote control including system/sub-system restoration changes in parameter values, and changes or restoration.

3) Provide NAS service and status information including the functional process related to sharing NAS infrastructure information to support infrastructure services management. This includes systems cost/performance, engineering analysis and assistance to field specialists carrying out maintenance activities. The sharing of real-time service information supports collaborative decision making with other NAS stakeholders such as the Air Traffic Service and the airlines.

NIMS Phase 3 will build upon previous phases and include intelligent fault correlation, information sharing, and additional functionality tied to NAS technological improvements.

The additional capabilities gained by the change to NIMS: A) The change from only having a local view of a problem to having a top-down view from a larger perspective (the Operations Control Center (OCC) and the National Operations Control Center (NOCC)); B) Increased remote maintenance; and C) Intelligent automatic fault correction. The FAA's national and international message and packet switching assets are monitored by two National Network Control Centers (NNCCs), one located in Atlanta, GA and the other in Salt Lake City, UT. Each NNCC domain covers approximately one-half of the country, however each can take over the entire country if major interruptions occur at the other NNCC. The FAA's non-packet switching assets are monitored as follows.

NAS infrastructure operations in the NIMS environment is a three-tiered hierarchy, consisting of a NOCC at the top tier, three OCCs at the second tier, and 30 Service Operations Centers (SOCs) and approximately 300 Work Centers (WCs) at the third tier.

The NOCC is located at the Air Traffic Control Systems Command Center (ATCSCC) in Herndon, Virginia. Under the NAS infrastructure operations in the NIM environment, the NOCC will be the top tier in a three-tier hierarchy. The NOCC coordinates operations from a national perspective and standardizes field operations across the NAS to help facilitate consistent interaction with customers.

OCCs are second tier in the NIM hierarchy. They function in a domain approximately one-third of the country in scope (including Alaska and offshore service areas). They provide coverage for all services, and have significant monitoring and control functions, with the exception of telecommunications. They coordinate with the NOCC. The three OCC locations are the Pacific OCC in San Diego, CA, the Mid-States OCC in Kansas City, KS, and the Atlantic OCC in Atlanta, GA.

SOCs and WCs are third tier in the NIM hierarchy. The SOC scope is limited to support of selected high NAS impact Air Traffic facilities such as Air Route Traffic Control Centers (ARTCCs) and selected high density Terminal Radar Approach Controls (TRACONs). SOCs cover all services, and have complete monitoring and control functions. The WC's scope is limited to a specific geographic area. Some WCs service large geographic areas while others service only single high NAS impact facilities. They cover all services, and have local control functions. They coordinate with the assigned OCC or SOC.

Infrastructure management support for space transportation users is generally provided by the Department of Defense (DoD), the National Aeronautics and Space Administration (NASA), and commercial space transportation service providers. The FAA supports Kennedy Space Center (KSC) Space Shuttle launch and recovery missions by monitoring and maintaining KSC tactical air navigation (TACAN) facilities on a fee-for-service basis. Prior to a launch or recovery mission, FAA technicians perform a facility certification check and report any operational limitations that cannot be corrected on-site prior to the scheduled missions. FAA maintains the TACAN facilities in accordance with FAA/NASA agreements.

Benefits

Providing a NAS wide view, allowing Airways Facilities personnel to identify patterns and NAS-wide issues. The NAS will be more efficiently managed. Some automated processes will be performed automatically by Decision Support System software. Human responses will also be more efficient, as the responses will be based on better, more complete information.

Systems

National Airspace System Infrastructure Management System Phase 1

National Airspace System Infrastructure Management System (NIMS) Phase 1 will consist of the following: 1. Increase the effectiveness of the operation, management, and control of NAS services and facilities; 2. Ensure the appropriate NAS equipment assets will be available to provide the capacity needed to handle projected air traffic levels; 3. Analyze information to establish trends, design predictive adaptive maintenance actions, and reduce critical equipment outage situations and aircraft delays; 4. Create a common Airway Facility (AF) operational data repository for accessibility across the user community; 5. Ensure that the required services are delivered in an era of declining monetary and personnel resources; and, 6. Reduce the future costs of doing business through AF workload reductions while continuously maintaining reliable, effective, and efficient service.

National Airspace System Infrastructure Management System Phase 2

National Airspace System Infrastructure Management System (NIMS) Phase 2 will enhance resource and enterprise management, by developing NAS customer and user interaction tools, and providing additional performance and cost trend analysis. The NIMS will provide status information to all NAS users in near real time via the System Wide Information Management (SWIM) system. NIMS Phase 2 will enhance NIMS Phase 1 by providing the tools to achieve the concept of NAS Infrastructure Management (NIM). This new approach to the operation and maintenance of the NAS infrastructure will incorporate a performance-based service management approach that is focused on achieving user and customer satisfaction and managing NAS infrastructure services. The key characteristics of the NIM concept are: 1. Consolidating expertise in control centers to provide rapid, effective response to customer needs, support centralized operational control, and gain efficiencies. 2. Centralized Remote Monitoring and Control of NAS infrastructure services and systems to provide efficient service delivery and systems management. 3. Nationwide Operations Planning to provide standardized field operations across the NAS to facilitate consistent interaction with customers. 4. Information Infrastructure to provide real-time information collection and distribution to provide common NAS performance metrics and cost accounting. 5. Performance Based Management to provide data for the prioritization of maintenance activities and investment decisions.

The NIMS Enterprise Management (EM) will monitor and control NAS subsystems, equipment, resources and the NIMS. An Enterprise Manager Suite, consisting of commercially available hardware and software components, is installed at each of the four Operations Control Centers. The NIMS Resource Manager (RM) will support all NIMS Resource Functions. The NIMS RM, consisting of commercially available hardware and software components, is installed at each of the four Operations Control Centers.

The NIMS Enterprise Manager will be integrated with the NIMS Resource Manager to provide, Automated Incident Ticketing, a Common Logging System, Real Time System Performance Monitoring, and a Centralized Logistics/Maintenance System.

National Airspace System Infrastructure Management System Phase 3

National Airspace System Infrastructure Management System (NIMS) Phase 3 will enhance Phase 2 enterprise and resource management, by further developing NAS customer and user interaction tools, and provide additional performance and cost trend analysis.

The NIMS Enterprise Management (EM) will monitor and control NAS subsystems, equipment and resources. The NIMS will provide status information to all NAS users in near real time via the System Wide Information Management (SWIM) system. An Enterprise Manager Suite, consisting of commercially available hardware and software components, is installed at each of the four Operations Control Centers. The NIMS Resource Manager (RM) will support all NIMS Resource Functions. The NIMS RM, consisting of commercially available hardware and software components, is installed at each of the four Operations Control Centers.

The NIMS Enterprise Manager will be integrated with the NIMS Resource Manager to provide, Automated Incident Ticketing, a Common Logging System, Real Time System Performance Monitoring, and a Centralized Logistics/Maintenance System.

Remote Maintenance Monitoring Subsystem

Hardware and software components comprising a subsystem of the NAS infrastructure management system. RMMS monitors system performance to detect alarm or alert conditions and transmits appropriate messages to the maintenance processor system/subsystem (MPS). RMMS initiates diagnostics tests and adjusts/changes system parameters or configurations when properly commanded. There are approximately 5,000 RMMS in service.

System Wide Information Management Build 1A

SWIM provides for National Airspace System (NAS)-wide transport and sharing of information between the Federal Aviation Administration and users. SWIM is a consistent and single point of entry for users to publish and subscribe to NAS data. SWIM provides context-sensitive information to NAS elements that require the information. SWIM replaces many single-focus networks, such as FIRMNet and CDMnet. This build will integrate Aeronautical, Weather, and NAS Resource Status information systems into the SWIM architecture. A SWIM Management Unit, at each facility, will support the sending (publishing) and receiving (subscribing) of data on SWIM and the SDN. A central SWIM Directory Management Unit will maintain a directory of data available for subscription and publication.

System Wide Information Management Build 1B

Build 1B provides all items in 1A, including more NAS information. This build integrates Flight and Surveillance Information systems into the SWIM architecture.

System Wide Information Management Build 2

SWIM Build 2 provides all items in both 1A and 1B, including air-ground network integration. Build 2 includes integration of SWIM with the Aeronautical Telecommunications Network, Next Generation Air/Ground Communications, Satellite

Communications, Ground Based Transceivers, Traffic Information Service-Broadcast, and Flight Information Service-Broadcast.

People

Airway Facility Specialist

Airway Facilities specialists are responsible for the certification and maintenance of FAA systems in facilities. The number and types of specialists depend on the number of systems under AF's responsibility. The major categories of specialties for AF personnel include automation, radar, navigation, communication, telecommunications, and environmental. Due to the quantity and complexity of systems within a facility, specialists focus on well-defined and specific areas of responsibilities.

Interfaces

no interfaces

Issues

Because NIMS provides functionality to AF personnel, it is considered a less-essential project than other ATC projects. As a result, the NIMS budget continuously is at risk.

Service Group Air Traffic Services

Service Infrastructure-Information Management Service

Capability Spectrum Management

Operational Improvement

Current Spectrum Management (109201)

Spectrum management secures, protects, and manages the radio spectrum for the FAA and the U.S. Aviation community. It is the focal point for management policy and plans, engineering, frequency assignment, radio interference resolution, radiation hazard, obstruction evaluation, electronic counter measures, and other National/International spectrum activities.
17-Dec-1903 to 17-Dec-2099

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

The FAA Office of Spectrum Policy and Management is responsible for ensuring that the radio frequency spectrum needs of both military and civil aviation are met. The aviation community is one of the major users of the radio frequency spectrum in the United States. The top three spectrum users in the Federal Government are the FAA, the Air Force, and the Navy. The FAA presently has over 50,000 frequency assignments. Virtually all of the FAA's navigation, communication, and surveillance systems are dependent on use of the radio frequency spectrum. Numerous aircraft systems, such as airborne weather radar, are also users of the spectrum. Spectrum engineers are involved from 'cradle-to-grave' in nearly all aviation systems. Radio frequency spectrums must be available before developing or procuring new communications electronics systems. Other responsibilities include assisting in determining the proper frequency band for proposed equipment and applicable standards; testing to ensure that equipment meets specifications for electromagnetic compatibility and radiation hazards criteria; and performing detailed on-site investigations needed to resolve cases of radio frequency interference.

The FAA's Office of Spectrum Policy and Management is also active in a number of world standards organizations addressing a wide variety of international spectrum issues. The various organizations develop policy, technical procedures, and criteria concerning the use, sharing, management, and allocation of the radio frequency spectrum. Establishment of frequency coordination procedures with other member nations is another important aspect of the international spectrum management process.

Benefits

Current operations are provided in the NAS.

People

Airway Facility Specialist

Airway Facilities specialists are responsible for the certification and maintenance of FAA systems in facilities. The number and types of specialists depend on the number of systems under AF's responsibility. The major categories of specialties for AF personnel include automation, radar, navigation, communication, telecommunications, and environmental. Due to the quantity and complexity of systems within a facility, specialists focus on well-defined and specific areas of responsibilities.

Interfaces

no interfaces

Issues

none identified

Service Group Air Traffic Services

Service Navigation

Capability Airborne Guidance

Operational Improvement

Area Navigation and Approaches with Vertical Guidance Using GPS/WAAS (107103)

Area navigation is supported throughout the NAS using affordable Global Positioning System (GPS) based avionics with Wide Area Augmentation System (WAAS) capabilities to provide the required position accuracy along a specified direct route.
31-Jul-2003 to 30-Dec-2022

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Area navigation (RNAV) is available throughout the National Airspace System (NAS) using satellite-based avionics equipment and systems. GPS/WAAS avionics accept and process GPS position and other related waypoint data, supplemented by range-correction information received from the WAAS geostationary satellites and network, to facilitate improved availability and continuity of satellite navigation services. GPS/WAAS enabled RNAV will allow the removal of all but a minimum operational network of VOR and a full complement of DME stations within the navigation infrastructure to support aviation as backup. GPS/WAAS avionics provide an approach with lateral with precision vertical guidance (LPV) to airports previously without instrument approach services. All instrument approaches require approved runway lighting facilities.

Benefits

Area navigation supported by low-cost WAAS avionics allows aircraft to fly direct routes, thereby reducing flight time and fuel consumption. WAAS also supports increased situational awareness as an enabler for improved advisory services, and expands the clearance options for controllers in separation assurance. WAAS provides increased access to airport runways in less than optimal Visual Meteorological Conditions (VMC), reducing the possibility of CFITs on approach as well as reducing the amount of holds/diversions, saving lives, fuel and time. WAAS-enabled area navigation provides benefits to pilots and communities by expanding the annual available runway hours.

Systems

Approach Lighting System with Sequenced Flashers Model 2

Approach Lighting System with Sequenced Flashers, Model 2 (ALSF-2) is a 2400 foot long array of high intensity incandescent lamps and flashers located on the final approach to a runway and are provided to support Catetory II and III instrument approaches. The ALSF-2 assists pilots transition from low visibility Instrument Meteorological Conditions (IMC) to visual conditions for landing. A row of green lights marks the runway threshold.

These ALSF-2 systems represent the current acquisition of NBP type systems.

Approach Lighting System with Sequenced Flashers Model 2 Technological Refresh

The Approach Lighting System with Sequenced Flashers Model 2 (ALSF-2) is a dual-mode system with 219 lamps that can be re-configured as a 50-light Simplified Short Approach Lighting system with Runway alignment lights (SSALR) to meet reduced approach lighting requirements. The ALSF-2 will support Category II and Category III precision landings and the SSALR will support Category I precision landings. The ALSF-2 tech refresh will utilize technology available in the procurement timeframe.

Approach Lighting System with Sequenced Flashing Lights Model 1

The Approach Lighting System with Sequenced Flashing Lights Model 1 (ALSF-1) is a system of high-intensity lights marking the extended runway centerline for 2,400 to 3,000 feet from the runway threshold. A row of green indicators mark the runway threshold.

ALSF-1 are very old systems and, when funded, will be replaced with current technology MALSR or ALSF-2 systems depending on whether the runway will support Cat I instrument approaches (MALSR) or Cat II/III instrument approaches (ALSF-2).

BSGS Broadcast Services Ground Station

The BSGS (Broadcast Services Ground Station) supports Air-Ground broadcast services. This includes the reception of ADS-B from equipped aircraft/vehicles and the transmission of Traffic Information Service-Broadcast (TIS-B) and Flight Information Service-Broadcast (FIS-B) for use by equipped aircraft. Generally, the BSGS will interface via the SDN to provide ADS-B information to ATC automation and receive TIS-B and FIS-B information from TIS-B and FIS-B servers. The BSGS includes antenna(s), one or more dual link (i.e., 1090 MHz Extended Squitter-1090ES and Universal Access Transceiver-UAT) Ground Based Transceiver(s)(GBT), processing functions and communications functions. Several configurations of the BSGS are required to support variations in the geographic service volume and functions to be supported at specific categories of operational sites. BSGSs will be installed at 448 airports and 100 en route locations. Included are those airports equipped with Secondary Surveillance Radar (SSR) and about 140 additional towered airports (currently without SSR). The BSGS will support ADS-B and TIS-B services via both the 1090ES link and by the UAT link. The BSGS will also support FIS-B via the UAT link. BSGSs incorporate a multilink gateway function that provides ADS-B rebroadcasts via the ADS-B alternate link. A BSGS incorporating 2 GBTs are required for airport surface and terminal surveillance coverage at each of 268 smaller airports, a BSGS incorporating 3 GBTs (on average) are required at 120 of the mid-sized airports, and a BSGS incorporating 6 GBTs (on average) are required at the 60 largest airport (those equipped with ASDE-X or ASDE-3 surface surveillance systems).

The following BSGS functions are required to support the various categories of NAS BSGS sites, except as noted below: (1) 1090ES and UAT receive/transmit (i.e., the GBT funnction); (2) multi-link gateway function; (3) process received ADS-B messages and output (via the SDN) ADS-B reports for use by ATC automation; (4) accept TIS-B and FIS-B information from ground TIS-B/FIS-B servers and manage the generation and broadcast of link specific TIS-B messages via the 1090ES and UAT links and FIS-B messages via the UAT link.

The following BSGS configurations are assumed based on the category of the operational site. Except as noted below all BSGS configuration support the above described functions.

En route (100 sites): (1) One multi-sector antenna with each sector connected to the individual 1090ES and UAT receivers. Supports up to 250 nmi. ADS-B reception. En route locations that are intended to provide only low-altitude gap filler coverage do not require the long-range capability. (2) One omni-directional transmit antenna. Transmitter power sized to support the required TIS-B and FIS-B coverage for that specific site.

Terminal/Airport without ASDE-X (415 airports incl. 27 ASDE-3 equipped airports) with each site having: (1) BSGS with at least 2 GBTs with omni-directional antennas sited for both airport surface and terminal airspace coverage; (2) additional GBTs as needed to provide coverage of the primary airport surface movement area.

Terminal/Airport with ASDE-X (26 ASDE-X plus 7 upgraded ASDE-3 airports with an average of 6 GBTs per BSGS): (1) ASDE-X ground stations upgraded to support GBT functionality; (2) At least two of the GBTs provide ADS-B coverage to the edge of the terminal airspace and the TIS-B coverage; (3) ASDE provides the surveillance data source to support TIS-B for surface traffic.

Baro-Altimeter Avionics

Baro-Altimeter Avionics (Baro-Alt Avionics NAV) is a barometrically correctable pressure actuated sensing altimeter that utilizes the change of atmospheric pressure to measure altitude above mean sea level (MSL). The altimeter senses pressure changes and displays altitude in feet or meters. Since changes in air pressure directly affect the accuracy of the altitude readout, the altimeter is equipped with an adjustable barometric scale. If capable, Baro-Alt Avionics may provide electrical output to encode a transponder for altitude reporting purposes and/or to use as an input to GPS Avionics or GPS/WAAS Avionics to compensate for deficiency in required satellites to calculate Receiver Autonomous Integrity Monitoring (RAIM) function required for en route through non-precision approaches.

Cockpit Display of Traffic Information Avionics

The Cockpit Display of Traffic Information Avionics (CDTI Avionics) is a generic name for a display that provides the flight crew with surveillance information about other proximate aircraft, including their position. It enables pilots to electronically "see and avoid" other aircraft.

Domestic Reduced Vertical Separation Minimum Altimeter

Domestic Reduced Vertical Separation Minimum Altimeter (Domestic RVSM Alt) is a source of altitude data or information that was added to support the RVSM capability. It consists of two independent altimeters with enhanced transducers or double aneroid sensors for computing altitude. The altitude source is connected through the static system to provide an automatic means correcting the known static source error of aircraft to improve aircraft altitude measurement capability. Domestic RVSM Alt may also be used to satisfy Oceanic RVSM and the altitude sensor may be included within an air data computer.

Enhanced Vision System

The Enhanced Vision System uses an infrared camera to provide the pilot with enhanced situational awareness during poor weather conditions and during nighttime approaches and landings.

Flight Management System

Flight Management System (FMS) is a computer system that uses a large database to allow routes to be preprogrammed and stored. The system is constantly updated with respect to position accuracy by reference to one or more conventional radio navigation aids (i.e., multi-sensor systems). The system may also use information from an inertial reference unit (IRU) or from a stand-alone inertial navigation system (INS). A sophisticated program and its associated database ensure that the most appropriate navaids are automatically selected during the update cycle. FMSs combine the relative position information from two or more point-referenced navigation aids such as VOR or DME to determine the absolute position of the aircraft (latitude, longitude). The resulting Area Navigation (RNAV) capability permits operation on any desired course.

Global Positioning System (key system)

The Global Positioning System (GPS) is a worldwide, all-weather, satellite-based navigation system developed, maintained & operated by the U.S Department of Defense, and managed by an Interagency executive board. GPS is a (nominal) 24 satellite constellation orbiting at approximately 12,000 miles above the earth in six planes. Each satellite broadcasts a precisely timed L-band signal on the same frequency. User GPS receivers, oboard aircraft, in ground vehicles or hand-held, receive and process the signals from all satellites in view, with a minimum of four satellites necessary to determine the receiver''s three-dimensional position (i.e., latitude, longitude and altitude), velocity (if applicable) and the precise time of day. GPS equipped aircraft can navigate on published jetways or utilize Area Navigation (RNAV) to fly any desired course between two locations.

GPS avionics built to TSO C-129 support en route and terminal area navigation, as well as non-precision instrument approach operations. Approval has been granted for properly certified GPS avionics to be used as a primary means of navigation in oceanic airspace and in certain remote areas. In July 2003 the Wide Area Augmentation System (WAAS)was commissioned to augment the GPS signal to meet primary navigation service requirements for accuracy, coverage, availability, and integrity.

Global Positioning System Avionics

Global Positioning System (GPS) Avionics process the signals received from four or more GPS satellites and determine the three-dimensional position (i.e., latitude, longitude and altitude) and velocity of an aircraft, as well as the precise time of day. GPS avionics provide an Area Navigation (RNAV) capability that permits operation on any desired course.

GPS avionics built to TSO-C129 do not have augmentation (WAAS, LAAS) and are approved only as a supplemental navigation system in the NAS, meaning that they must be used in conjunction with a primary navigation system. TSO-C129 avionics support en route and terminal area navigation, as well as non-precision instrument approach operations. Approval has been granted for properly certified GPS avionics to be used as a primary means of navigation in oceanic airspace and in certain remote areas. In certain regions of the world (including the NAS), GPS will be augmented (Wide Area and Local Area systems) to satisfy additional requirements for accuracy, coverage, availability, and integrity. Augmented GPS avionics (WAAS, LAAS) are expected to support precision instrument approach operations, and to gain approval as a primary navigation system throughout the NAS. It is anticipated that users will migrate from TSO-C129 avionics to augmented GPS avionics (WAAS, LAAS).

Inertial Navigation System Avionics

Inertial Navigation System Avionics (INS Avionics) is a self-contained system, comprised of gyroscopes, accelerometers, and a navigation computer, which provides navigation information in response to inertial effects on system components. An INS is typically aligned with accurate position information prior to departure, and thereafter calculates its position as it progresses to the destination. INS accuracy degrades with time, but can be aligned in flight using radio navigation system updates. Many inertial systems employ a sophisticated automatic update scheme using dual- Distance Measuring Equipment (DME), very high frequency (VHF) Omnidirectional Range VOR or other sensor inputs (e.g., Global Positioning System (GPS)).

INS may be approved as a primary navigation system or may be used in combination with other systems. By programming a series of waypoints, the system will navigate along a predetermined track. INS provides an Area Navigation (RNAV) capability that permits operation on any desired course.

Lead-in-light System

A Lead-in-light System (LDIN) consists of one or more series of flashing lights installed at or near ground level that provides positive visual guidance along an approach path, either curving or straight, where special problems exist with hazardous terrain, obstructions, or noise abatement procedures.

Low Power Distance Measuring Equipment

Distance Measuring Equipment (DME) is an Ultra High Frequency (UHF) ground-based radio-navigation aid. DME avionics reply to interrogations from the ground station, which is capable of processing replies from over 100 aircraft at one time. The DME determines the time between an interrogation and a reply to determine the slant range between them.

Acquisition projects have been established for two generic classes of DME ground stations: high power and low power. High power DMEs (HPDMEs)are rated at 1kw and are located to support enroute navigation. HPDMEs are typically co-located with VHF OmniRange systems, forming what is termed a VOR/DME facility. Low power DMEs (LPDMEs) are rated at 100w and are located to support terminal area navigation such as ILS approaches.

LPDMEs are installed with many ILS facilities. When specified in the ILS approach procedure, DME may be used in lieu of the outer marker, as a back-course final approach fix, or to establish other fixes on the localizer course. LPDMEs are also installed with some localizer-only (LOC) facilities. Additional LPDMEs are being installed to support ILS approaches as recommended by the Commercial Aviation Safety Team (CAST).

Medium-Intensity Approach Light System with Runway Alignment Indicator Lights

The Medium-Intensity Approach Light System with Runway Alignment Indicator Lights (MALSR) supports Category I instrument approaches. It is a medium intensity light system that identifies the extended runway centerline from threshold to 2,400 feet before the threshold. The MALSR supports Category I instrument approaches and presents to the pilot the illusion of a ball of light traveling from the outer end of the system to a point approximately 1,400 feet from the end of the runway. A row of green lights marks the threshold of the runway.

MALSF and MALS are subsets of MALSR. A MALSR has 45 lights, 5 flashers, and is 2400 ft in length. A MALSF has 45 lights, 3 flashers, and is 1400 ft in length. MALS has 45 lights, no flashers, and is 1400 ft in length.

Medium-Intensity Approach Light System with Runway Alignment Indicator Lights Next Generation

The Medium-Intensity Approach Light System with Runway Alignment Indicator Lights (RAIL) Next Generation (MALSR NEXGEN) is an array of medium-intensity lights marking the extended runway centerline for approaching aircraft. The RAIL begins 2400 feet from threshold and extends 1000 feet. The MALSR supports Category I instrument approaches and presents the illusion of a ball of light leading towards the runway. The MALS portion of the MALSR begins 1400 feet from threshold and ends 200 feet from threshold. A row of green lights marks the threshold of the runway.

Medium-Intensity Light System with Runway Alignment Indicator Lights Technology Refresh

The Medium-Intensity Light System with Runway Alignment Indicator Lights Technology Refresh (MALSR Tech Refresh) is an array of high intensity Light Emitting Diode (LED) lights marking the extended runway centerline for 2,400 to 3,000 feet from the runway threshold. The MALSR supports Category I instrument approaches and presents to the pilot the illusion of a ball of light traveling from the outer end of the system to a point about 1,400 feet from the end of the runway. An indicator marks a point 1,000 feet from the end of the runway. A row of green lights indicates the threshold of the runway.

Omnidirectional Approach Lighting System

The Omnidirectional Approach Lighting System (ODALS) is a system of sequenced flashing lights marking the extended runway centerline for 1,500-feet. Indicators placed at the end of the runway mark each edge of the runway.

Precision Approach Path Indicator

The Precision Approach Path Indicator (PAPI) provides precision visual glide slope guidance to pilots landing in Visual Flight Rules (VFR) conditions. The PAPI consists of four sharp transition projector units located on one side of the runway, spaced laterally at 29.5-foot intervals.

Radar Altimeter Avionics

Radar or Radio Altimeter (RADALT) avionics makes use of the reflection of radio waves from the ground to provide absolute altitude indications to the pilot, as well as altitude inputs to automatic flight control systems and to Traffic Alert and Collision Avoidance Systems (TCAS) for various functions, and is required to conduct Category II and III precision instrument approaches.

Runway Alignment Indicator Lights

Runway Alignment Indicator Lights (RAIL) are a series of sequenced flashing lights that are installed only in combination with other lighting systems.

Runway Centerline Lighting

Runway Centerline Lighting (RWCLL) consists of flush centerline lights spaced at 50-foot intervals beginning 75 feet from the landing threshold and extending to within 75 feet of the opposite end of the runway.

Runway End Identifier Lighting (Next Generation)

Runway End Identifier Lights (REIL) (Next Generation) is the next generation of an airport lighting facility in the terminal area navigation system, consisting of one flashing white high intensity light installed at each approach end corner of a runway and directed towards the approach zone, which enables the pilot to identify the approach end of the runway.

Runway End Identifier Lights

Runway End Identifier Lights (REIL) is an airport lighting system consisting of two flashing, white, high intensity lights located at each approach end corner of a runway. The REILs are directed towards the approach zone to enable pilots to identify the end of the runway.

Runway Lights/Runway Edge Lights

Runway Lights/Runway Edge Lights (RL/REL) are lights having a prescribed angle of emission used to define the lateral limits of a runway. Runway lights are uniformly spaced at intervals of approximately 200-feet, and the intensity may be controlled or preset.

Runway lights and ruuway edge lights are procured, installed, and maintained by the airport. The FAA is not involved with these light systems other than publishing the necssary lighting standards which the airport uses for guidance.

Runway Visual Range

Runway Visual Range (RVR) systems provide a standardized, instantaneous, and accurate method of measuring visibility along runways

Short Approach Lighting System

A Short Approach Lighting System (SALS) is an array of high-intensity lights marking the extended runway centerline for 2,400 to 3,000 feet from the runway threshold. The system presents to the pilot the illusion of a ball of light traveling from the outer end of the system to a point 1,000 feet from the end of the runway. Two additional rows of lights indicate the edges of the runway for the last 1,000 feet with special indicators placed 1,000 feet, 500 feet and at the runway threshold.

Short Approach Lighting System with Sequenced Flashing Lights

Short Approach Lighting System with Sequenced Flashing Lights (SALSF) is an array of high intensity lights marking the extended runway centerline for 1,500 feet. The system presents to the pilot the illusion of a ball of light traveling from the outer end of the system to a point 1,000 feet from the end of the runway. Indicators placed at the end of the runway mark the center and each edge of the runway. An additional indicator marks a point 1,000 feet from the end of the runway.

Simplified Short Approach Light System with Runway Alignment Indicator Lights

The Simplified Short Approach Light System with Runway Alignment Indicator Lights (SSALR) is a SSALS facility with sequence flashers installed from 1,600 to 2,400 feet from the runway threshold. Normal spacing between lights is 200 feet. This system assists pilots in transitioning from precision approach Instrument Flight Rules (IFR) to Visual Flight Rules (VFR) for landing.

Simplified Short Approach Lighting System

The Simplified Short Approach Lighting System (SSALS) is an array of medium-intensity lights marking the extended runway centerline for 1,400 feet. A special indicator marks a point 1,000 feet from the end of the runway. A row of green lights indicates the threshold runway.

Simplified Short Approach Lighting System with Sequenced Flashing Lights

The Simplified Short Approach Lighting System with Sequenced Flashing Lights (SSALF) is a system of medium-intensity lights marking the extended runway centerline for 1,400 feet. The system presents to the pilot the illusion of a ball of light traveling from the outer end of the system (1,400 feet) to a point 1,000 feet from the end of the runway. A special indicator marks a point 1,000 feet from the end of the runway. A row of green lights indicates the threshold runway.

Tactical Air Navigation Avionics

Tactical Air Navigation Avionics (TACAN Avionics) provide both the bearing and distance to the ground station - and hence a navigational position fix. Many avionics models include an air-to-air mode that enables aircraft to determine distance from each other, which can be particularly useful in rendezvous operations. TACAN is approved as a primary navigation system in the NAS for military and naval operations.

DoD plans to equip military aircraft with GPS. However, with the planned retention of TACAN ground systems as a backup to GPS, TACAN avionics are expected to remain in service indefinitely in some classes of military aircraft.

Touchdown Zone Lighting

A Touchdown Zone Lighting (TDZL) consists of two rows of transverse light bars located symmetrically about the runway centerline normally at 100-foot intervals. The basic system extends 3,000 feet along the runway.

Visual Approach Slope Indicator

A Visual Approach Slope Indicator (VASI) system is a light system that is accurately located alongside a runway to provide a visual glide slope to landing aircraft. VASIs radiate a directional pattern of high intensity, red and white focused light beams to form the glide path and are utilized primarily under Visual Flight Rules (VFR) conditions.

WAAS Corrections Broadcast Service (key system)

WAAS Corrections Broadcast Service is comprised of both Space-based and Ground Earth Station components.

Geostationary Earth Orbit (GEO) satellites receive Wide Area Augmentation System (WAAS) correction and integrity information transmitted by Ground Earth Stations (in WAAS terms referred to as Ground Uplink Stations (GUSs)) with information re-broadcast for WAAS avionics reception and use. Current broadcast service leased from INMARSAT".

Wide Area Augmentation System

The Wide Area Augmentation System (WAAS) consists of a distributed array of Reference and Master Stations designed to provide range correction and integrity information messages that are used by WAAS-capable Global Positioning System (GPS)avionics to accurately determine an aircraft"s 3-dimensional position in space. Accurately surveyed WAAS Reference Stations (WRS) receive and process GPS satellite range data which is forwarded to redundant WAAS Master Stations (WMS) for additional processing before sending the resulting range-correction data to redundant WAAS Ground Uplink Stations (GUS). The GUS transmit the data to Geostationary (GEO) satellites which retransmit them on a GPS civil-use frequency for reception by GPS/WAAS avionics. The WAAS data enables aircraft to determine their position in the airspace with an accuracy that will enable, for WAAS-equipped aircraft, introduction of advanced navigation initiatives such as precision and non-precision approaches to airports throughout the NAS, and reduced longitudinal separation.

The WAAS service volume includes the contiguous United States, Hawaii, portions of Alaska and the Caribbean, and the US border areas with Canada and Mexico. Planned enhancement of WAAS with additional WRS and GEO satellites will improve the coverage and availability of WAAS. Enhancement of the GPS by the Department of Defense (DoD) will provide a second civil frequency for WAAS that will provide additional improvements in navigation performance throughout the NAS. This latter version of the WAAS will be termed the GPS Landing System (GLS).

Wide Area Augmentation System Avionics (key system)

Airborne Navigation Sensors Using the Global Positioning System (GPS) Augmented by the Wide Area Augmentation System (WAAS) combines navigation solutions from time and pseudoranges provided by the DoD Global Positioning System (GPS) satellites within view of the aircraft and pseudoranges provided by the Wide Area Augmentation (WAAS) geostationary satellites in view to compute navigation guidance with respect to courses selected by the flight crew. GPS/WAAS Avionics are approved for use as a primary means of navigation within the CONUS, where available, to satisfy en route, terminal area, and non-precision approaches providing lateral course guidance only. Lateral Navigation (LNAV)/Vertical Navigation (VNAV) non-precision approaches to lower minima are feasible using baro-altimeter avionics inputs. Lateral with Precision Vertical (LPV) guidance using GPS/WAAS Avionics to satisfy near Category I precision approaches with higher minima than ILS is also feasible, when approved under SIAP.

Wide Area Augmentation System Technology Refresh

Elements of WAAS technical refresh consist of two paths. One is improvement to operational capability that enhances performance of WAAS. The other is the known replacement of equipment, including hardware, software, and telecommunications links and networks within the WAAS WMS and GUS.

Technical refresh is subject to "re-baselining" activity that is currently underway and the FAA will make a corporate decision in September 2004.

Support Activities

AF Procedure Development for Low-cost Area Navigation Using WAAS

Airway Facilities procedures document the way airway facility operations are to be executed. The introduction of new systems, or changes to existing systems results in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

AF Training for Low-cost Area Navigation Using WAAS

Airway Facilities (AF) training is provided to AF workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AF Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

Non-FAA Pilot Training for Low-cost Area Navigation Using WAAS

Non-FAA Pilot Training is provided to educate pilots as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional pilot training. Training will generally begin 60 days prior to IOC and be complete within one year following Full Operating Capability.

People

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Interfaces

Global Positioning System — (Position Data) → Wide Area Augmentation System Avionics

WAAS (or GPS/WAAS) avionics consists of navigation sensors or stand-alone receiver/navigators which use GPS augmented by WAAS that combine navigation solutions from time and pseudoranges provided by the GPS satellites within view of the aircraft and pseudoranges provided by the WAAS GEOs in view to compute navigation guidance with respect to courses selected by the flight crew. GPS/WAAS avionics are approved for use as a primary means of navigation within the CONUS, where available, to satisfy en route, terminal area, and non-precision approaches providing lateral course guidance only. Lateral Navigation (LNAV)/Vertical Navigation (VNAV) approaches to lower minima are feasible using baro-altimeter avionics inputs. Lateral with Precision Vertical (LPV) guidance using GPS/WAAS avionics to support near Category I precision approaches with higher minima than ILS is also feasible, when approved under Standard Instrument Approach Procedures.

WAAS Corrections Broadcast Service — (Position Data) → Wide Area Augmentation System Avionics

WAAS (or GPS/WAAS) avionics consist of navigation sensors or stand-alone receiver/navigators which use GPS augmented by WAAS that combine navigation solutions from time and pseudoranges provided by the GPS satellites within view of the aircraft and pseudoranges provided by the WAAS geostationary satellites. WAAS Corrections Broadcast Facilities consist of both Space-based and Ground Earth Station components.

Issues

Defining backbone locations for ground-based navaids to serve as a backup to WAAS.

Service Group Air Traffic Services

Service Navigation

Capability Airborne Guidance

Operational Improvement

Current Enroute Navigation (107101)

Independent ground and space-based navigation systems that support both area navigation (point-to-point) and flights on published Jetroutes and Victor Airways.

01-Jan-1994 to 30-Dec-2022

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

NAS provided ground- and space-based navigation services support point-to-point navigation on published Jet Routes and Victor Airways using the services and facilities of VHF Omnidirectional Range (VOR), VOR and Distance Measuring Equipment (DME), TACAN, or Non-Directional Beacon (NDB) supported using Automatic Direction Finding (ADF) avionics. Area navigation (RNAV) is achievable using VOR/DME facilities and approved avionics as primary means and/or Global Positioning System (GPS), GPS and Wide Area Augmentation System (GPS/WAAS) avionics, or Loran-C avionics approved as supplemental means. Inertial Navigation Systems (INS) provide a sufficient margin of performance for domestic RNAV operations provided that GPS, Loran-C, VOR, DME, or TACAN updates to position are provided to the INS at least once per hour. Flight Management Systems (FMS) provide additional functionality by combining navigation position from multiple sensors and enabling other reporting functions of automatic reporting of aircraft present position latitude, longitude, and geometric altitude for station keeping and collision avoidance.

Benefits

Current operations are provided in the NAS.

Systems

Automatic Direction Finder

Automatic Direction Finder (ADF) - An aircraft radio navigation system which senses and indicates the direction to a L/MF nondirectional radio beacon (NDB) ground transmitter. Direction is indicated to the pilot as a magnetic bearing or as a relative bearing to the longitudinal axis of the aircraft depending on the type of indicator installed in the aircraft. In certain applications, such as military, ADF operations may be based on airborne and ground transmitters in the VHF/UHF frequency spectrum.

Baro-Altimeter Avionics

Baro-Altimeter Avionics (Baro-Alt Avionics NAV) is a barometrically correctable pressure actuated sensing altimeter that utilizes the change of atmospheric pressure to measure altitude above mean sea level (MSL). The altimeter senses pressure changes and displays altitude in feet or meters. Since changes in air pressure directly affect the accuracy of the altitude readout, the altimeter is equipped with an adjustable barometric scale. If capable, Baro-Alt Avionics may provide electrical output to encode a transponder for altitude reporting purposes and/or to use as an input to GPS Avionics or GPS/WAAS Avionics to compensate for deficiency in required satellites to calculate Receiver Autonomous Integrity

Monitoring (RAIM) function required for en route through non-precision approaches.

Distance Measuring Equipment (key system)

Distance Measuring Equipment (DME) is a UHF (Ultra High Frequency) ground-based radio navigation aid. DME avionics transmit interrogation pulses, and the ground-based responder sends a reply. The avionics process the reply and determine the slant range between the aircraft and the ground station. Separate funding segments and acquisition projects have been established for two generic classes of DME ground stations: High power (en route) DMEs, and low power (terminal) DMEs. This mechanism addresses the high power DMEs.

DMEs may be provided alone, but are more often collocated with a VOR to form a VOR/DME facility, allowing aircraft to determine both the bearing and slant range to the ground station - and hence a navigational position fix. DMEs are approved as a primary navigation system in the NAS. The DME function is frequently provided by the TACAN system that also provides azimuth guidance to military users. (DME and the distance-measuring portion of TACAN are functionally the same.) When combined with a VOR, these facilities are called VORTACs.

The DME network will be sustained to support en route navigation and to serve as an independent backup navigation source to GPS and GPS/WAAS. The DME network may also need to be expanded to provide a redundant area navigation (RNAV) capability for terminal area operations at major airports.

Distance Measuring Equipment Avionics

Distance Measuring Equipment Avionics (DME Avionics) receives, processes and displays for the pilot the distance data provided by ground-based DMEs.

Domestic Reduced Vertical Separation Minimum Altimeter

Domestic Reduced Vertical Separation Minimum Altimeter (Domestic RVSM Alt) is a source of altitude data or information that was added to support the RVSM capability. It consists of two independent altimeters with enhanced transducers or double aneroid sensors for computing altitude. The altitude source is connected through the static system to provide an automatic means correcting the known static source error of aircraft to improve aircraft altitude measurement capability. Domestic RVSM Alt may also be used to satisfy Oceanic RVSM and the altitude sensor may be included within an air data computer.

Flight Management System

Flight Management System (FMS) is a computer system that uses a large database to allow routes to be preprogrammed and stored. The system is constantly updated with respect to position accuracy by reference to one or more conventional radio navigation aids (i.e., multi-sensor systems). The system may also use information from an inertial reference unit (IRU) or from a stand-alone inertial navigation system (INS). A sophisticated program and its associated database ensure that the most appropriate navaids are automatically selected during the update cycle. FMSs combine the relative position information from two or more point-referenced navigation aids such as VOR or DME to determine the absolute position of the aircraft (latitude, longitude). The resulting Area Navigation (RNAV) capability permits operation on any desired course.

Global Positioning System (key system)

The Global Positioning System (GPS) is a worldwide, all-weather, satellite-based navigation system developed, maintained & operated by the U.S Department of Defense, and managed by an Interagency executive board. GPS is a (nominal) 24 satellite constellation orbiting at approximately 12,000 miles above the earth in six planes. Each satellite broadcasts a precisely timed L-band signal on the same frequency. User GPS receivers, oboard aircraft, in ground vehicles or hand-held, receive and process the signals from all satellites in view, with a minimum of four satellites necessary to determine the receiver''s three-dimensional position (i.e., latitude, longitude and altitude), velocity (if applicable) and the precise time of day. GPS equipped aircraft can navigate on published jetways or utilize Area Navigation (RNAV) to fly any desired course between two locations.

GPS avionics built to TSO C-129 support en route and terminal area navigation, as well as non-precision instrument approach operations. Approval has been granted for properly certified GPS avionics to be used as a primary means of navigation in oceanic airspace and in certain remote areas. In July 2003 the Wide Area Augmentation System (WAAS)was commissioned to augment the GPS signal to meet primary navigation service requirements for accuracy, coverage, availability, and integrity.

Global Positioning System Avionics (key system)

Global Positioning System (GPS) Avionics process the signals received from four or more GPS satellites and determine the three-dimensional position (i.e., latitude, longitude and altitude) and velocity of an aircraft, as well as the precise time of day. GPS avionics provide an Area Navigation (RNAV) capability that permits operation on any desired course.

GPS avionics built to TSO-C129 do not have augmentation (WAAS, LAAS) and are approved only as a supplemental navigation system in the NAS, meaning that they must be used in conjunction with a primary navigation system. TSO-C129 avionics support en route and terminal area navigation, as well as non-precision instrument approach operations. Approval has been granted for properly certified GPS avionics to be used as a primary means of navigation in oceanic airspace and in certain remote areas. In certain regions of the world (including the NAS), GPS will be augmented (Wide Area and Local Area systems) to satisfy additional requirements for accuracy, coverage, availability, and integrity. Augmented GPS avionics (WAAS, LAAS) are expected to support precision instrument approach operations, and to gain approval as a primary navigation system throughout the NAS. It is anticipated that users will migrate from TSO-C129 avionics to augmented GPS avionics (WAAS, LAAS).

Inertial Navigation System Avionics (key system)

Inertial Navigation System Avionics (INS Avionics) is a self-contained system, comprised of gyroscopes, accelerometers, and a navigation computer, which provides navigation information in response to inertial effects on system components. An INS is typically aligned with accurate position information prior to departure, and thereafter calculates its position as it progresses to the destination. INS accuracy degrades with time, but can be aligned in flight using radio navigation system updates. Many inertial systems employ a sophisticated automatic update scheme using dual- Distance Measuring Equipment (DME), very high frequency (VHF) Omnidirectional Range VOR or other sensor inputs (e.g., Global Positioning System (GPS)).

INS may be approved as a primary navigation system or may be used in combination with other systems. By programming a series of waypoints, the system will navigate along a predetermined track. INS provides an Area Navigation (RNAV) capability that permits operation on any desired course.

Loran-C

Loran-C is a low frequency (LF), long-range, ground-based radionavigation aid operated by the U.S. Coast Guard. Loran-C avionics measure the time difference between signals received from three or more ground stations and determine the two-dimensional position (i.e., latitude and longitude) and velocity of the aircraft. Loran-C avionics provide an Area Navigation (RNAV) capability that permits operation on any desired course within the coverage area of the stations being used.

Loran-C is currently approved as a supplemental system in the National Airspace System (NAS), meaning that it must be used in conjunction with a primary system. Current Loran-C avionics support en route navigation but do not support instrument approach operations.

Operation of Loran-C beyond 2008 will be based upon a determination by the Department of Transportation and the Department of Homeland Security whether the system is needed as a backup to GPS for transportation and timing applications.

Loran-C Avionics

Loran-C Avionics receive, process, and display to the pilot the latitude and longitude of the aircraft""s current position, based on data received from ground-based equipment.

Loran-C is currently approved as a supplemental system in the NAS, meaning that it must be used in conjunction with a primary system. Current Loran-C avionics support en route and terminal area navigation but do not support instrument approach operations. System operation beyond 2008 depends upon analysis by FAA and USCG to ascertain ability to support aviation nonprecision approach operations and maritime harbor entrance & approach operations.

Non-Directional Beacon

Non-Directional Beacons (NDB) are low frequency (LF) or medium frequency (MF) ground-based radio navigation aids that broadcast a continuous wave (CW) signal with a Morse code identification on an assigned frequency signal. NDBs are used by pilots to determine the aircraft''s bearing to the ground station. Some state-owned and locally owned NDBs are also used to provide weather information to pilots.

NDBs can be used for non-precision approaches at low traffic airports, as compass locators (locator outer markers (LOMs)) to aid a pilot in finding the initial approach point of an Instrument Landing System (ILS), and for en route operations in remote areas. NDBs are approved as a primary navigation system in the National Airspace System (NAS).

Tactical Air Navigation Avionics

Tactical Air Navigation Avionics (TACAN Avionics) provide both the bearing and distance to the ground station - and hence a navigational position fix. Many avionics models include an air-to-air mode that enables aircraft to determine distance from each other, which can be particularly useful in rendezvous operations. TACAN is approved as a primary navigation system in the NAS for military and naval operations.

DoD plans to equip military aircraft with GPS. However, with the planned retention of TACAN ground systems as a backup to GPS, TACAN avionics are expected to remain in service indefinitely in some classes of military aircraft.

Tactical Air Navigation System (key system)

Tactical Air Navigation (TACAN) is a UHF (ultra high frequency) ground-based radio navigation aid that is the military counterpart of VHF Omnidirectional Range co-located with Distance Measuring Equipment (VOR/DME). TACAN avionics provide both the bearing and slant range to the ground station - and hence a navigation position fix. TACAN is often collocated with civil VOR systems to form a VORTAC to support military aircraft operations. TACAN is approved as a primary navigation system in the National Airspace System (NAS).

Very High Frequency Omnidirectional Range (key system)

The Very High Frequency Omnidirectional Range (VOR) is a ground-based radio navigation aid that broadcasts azimuth information to aircraft. VORs broadcast on assigned channels and include the facility identification in Morse code for pilot monitoring and verification. Some VORs are capable of broadcasting weather information and supporting pilot-controller communcations although these capabilities are typically provided by other infrastructure systems. In addition to providing en route and terminal area azimuth guidance, VORs also support nonprecision instrument approach operations.

Currently, VORs are the primary radio navigation aid in the National Airspace System (NAS). They serve as the internationally designated standard short-distance radio navigation aid for air carrier and general aviation Instrument Flight Rules (IFR) operations.

VORs may be installed stand-alone or co-located with either a DME or TACAN system. When co-located the facility is typically referred to as a VOR/DME or VORTAC facility, respectively. This configuration allows pilots to determine their aircraft''s bearing and distance to a single location, i.e., fix.

With the advent of space-based navigation capabilities, a planned reduction in operational VORs will begin in approximately 2010. The reduction will result in a "backbone" minimum operational network (MON) that will support IFR operations at the busiest airports in the NAS while serving as a backup for space-based navigation.

Very High Frequency Omnidirectional Range Avionics

Very High Frequency Omnidirectional Range Avionics (VOR Avionics) receive, process, and display for the pilot the azimuth (bearing) to or from ground-based VOR transmitters.

Increasing numbers of aircraft are being equipped with GPS or WAAS avionics. However, since a reduced network of VOR stations is planned to continue in operation indefinitely as a backup to GPS, VOR avionics are expected to remain in service indefinitely in some aircraft.

Very High Frequency Omnidirectional Range Test

A ground facility, which emits a test signal to check VOR receiver accuracy. Some VOTs are available to the user while airborne, and others are limited to ground use only. The airborne use of VOT is strictly limited to those areas/altitudes specifically authorized in the A/FD or appropriate supplement.

WAAS Corrections Broadcast Service

WAAS Corrections Broadcast Service is comprised of both Space-based and Ground Earth Station components.

Geostationary Earth Orbit (GEO) satellites receive Wide Area Augmentation System (WAAS) correction and integrity information transmitted by Ground Earth Stations (in WAAS terms referred to as Ground Uplink Stations (GUSs)) with information re-broadcast for WAAS avionics reception and use. Current broadcast service leased from INMARSAT".

Wide Area Augmentation System

The Wide Area Augmentation System (WAAS) consists of a distributed array of Reference and Master Stations designed to provide range correction and integrity information messages that are used by WAAS-capable Global Positioning System (GPS)avionics to accurately determine an aircraft"s 3-dimensional position in space. Accurately surveyed WAAS Reference Stations (WRS) receive and process GPS satellite range data which is forwarded to redundant WAAS Master Stations (WMS) for additional processing before sending the resulting range-correction data to redundant WAAS Ground Uplink Stations (GUS). The GUS transmit the data to Geostationary (GEO) satellites which retransmit them on a GPS civil-use frequency for reception by GPS/WAAS avionics. The WAAS data enables aircraft to determine their position in the airspace with an accuracy that will enable, for WAAS-equipped aircraft, introduction of advanced navigation initiatives such as precision and non-precision approaches to airports throughout the NAS, and reduced longitudinal separation.

The WAAS service volume includes the contiguous United States, Hawaii, portions of Alaska and the Caribbean, and the US border areas with Canada and Mexico. Planned enhancement of WAAS with additional WRS and GEO satellites will improve the coverage and availability of WAAS. Enhancement of the GPS by the Department of Defense (DoD) will provide a second civil frequency for WAAS that will provide additional improvements in navigation performance throughout the NAS. This latter version of the WAAS will be termed the GPS Landing System (GLS).

Wide Area Augmentation System Avionics

Airborne Navigation Sensors Using the Global Positioning System (GPS) Augmented by the Wide Area Augmentation System (WAAS) combines navigation solutions from time and pseudoranges provided by the DoD Global Positioning System (GPS) satellites within view of the aircraft and pseudoranges provided by the Wide Area Augmentation (WAAS) geostationary satellites in view to compute navigation guidance with respect to courses selected by the flight crew. GPS/WAAS Avionics are approved for use as a primary means of navigation within the CONUS, where available, to satisfy en route, terminal area, and non-precision approaches providing lateral course guidance only. Lateral Navigation (LNAV)/Vertical Navigation (VNAV) non-precision approaches to lower minima are feasible using baro-altimeter avionics inputs. Lateral with Precision Vertical (LPV) guidance using GPS/WAAS Avionics to satisfy near Category I precision approaches with higher minima than ILS is also feasible, when approved under SIAP.

People

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Interfaces

Global Positioning System — (Position Data) → Global Positioning System Avionics

GPS Avionics equipment provides position data by accurately measuring clock and pseudorange data from GPS satellites.

Issues

None

Service Group Air Traffic Services

Service Navigation

Capability Airborne Guidance

Operational Improvement

Current Non-precision Approach and Departure (107111)

Ground-based precision navigation aids provide lateral approach and departure guidance for a runway in accordance with published approach procedures.

01-May-1998 to 01-Jan-2020

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

NAS provided ground- and space-based navigation services support non-precision instrument navigation for lateral approach and departure guidance using the services and facilities of VOR, VOR and DME, Localizer (LOC), or NDB supported using ADF avionics. Non-precision instrument approaches are also available using area navigation (RNAV) relying upon VOR/DME facilities and approved avionics. GPS, GPS with Baro or GPS/WAAS avionics may also be used to provide LNAV, VNAV, or LPV (WAAS) approaches where authorized. Flight Management Systems (FMS) provide additional functionality by combining navigation position from multiple sensors and enabling guidance for a runway in accordance with published instrument approach and departure procedures.

Benefits

Current operations are provided in the NAS.

Systems

Approach Lighting System with Sequenced Flashers Model 2

Approach Lighting System with Sequenced Flashers, Model 2 (ALSF-2) is a 2400 foot long array of high intensity incandescent lamps and flashers located on the final approach to a runway and are provided to support Catetory II and III instrument approaches. The ALSF-2 assists pilots transition from low visibility Instrument Meteorological Conditions (IMC) to visual conditions for landing. A row of green lights marks the runway threshold.

These ALSF-2 systems represent the current acquisition of NBP type systems.

Approach Lighting System with Sequenced Flashers Model 2 Technological Refresh

The Approach Lighting System with Sequenced Flashers Model 2 (ALSF-2) is a dual-mode system with 219 lamps that can be re-configured as a 50-light Simplified Short Approach Lighting system with Runway alignment lights (SSALR) to meet reduced approach lighting requirements. The ALSF-2 will support Category II and Category III precision landings and the SSALR will support Category I precision landings. The ALSF-2 tech refresh will utilize technology available in the procurement timeframe.

Approach Lighting System with Sequenced Flashing Lights Model 1

The Approach Lighting System with Sequenced Flashing Lights Model 1 (ALSF-1) is a system of high-intensity lights marking the extended runway centerline for 2,400 to 3,000 feet from the runway threshold. A row of green indicators mark the runway threshold.

ALSF-1 are very old systems and, when funded, will be replaced with current technology MALSR or ALSF-2 systems depending on whether the runway will support Cat I instrument approaches (MALSR) or Cat II/III instrument approaches (ALSF-2).

Automatic Direction Finder

Automatic Direction Finder (ADF) - An aircraft radio navigation system which senses and indicates the direction to a L/MF nondirectional radio beacon (NDB) ground transmitter. Direction is indicated to the pilot as a magnetic bearing or as a relative bearing to the longitudinal axis of the aircraft depending on the type of indicator installed in the aircraft. In certain applications, such as military, ADF operations may be based on airborne and ground transmitters in the VHF/UHF frequency spectrum.

Baro-Altimeter Avionics

Baro-Altimeter Avionics (Baro-Alt Avionics NAV) is a barometrically correctable pressure actuated sensing altimeter that utilizes the change of atmospheric pressure to measure altitude above mean sea level (MSL). The altimeter senses pressure changes and displays altitude in feet or meters. Since changes in air pressure directly affect the accuracy of the altitude readout, the altimeter is equipped with an adjustable barometric scale. If capable, Baro-Alt Avionics may provide electrical output to encode a transponder for altitude reporting purposes and/or to use as an input to GPS Avionics or GPS/WAAS Avionics to compensate for deficiency in required satellites to calculate Receiver Autonomous Integrity Monitoring (RAIM) function required for en route through non-precision approaches.

Distance Measuring Equipment (key system)

Distance Measuring Equipment (DME) is a UHF (Ultra High Frequency) ground-based radio navigation aid. DME avionics transmit interrogation pulses, and the ground-based responder sends a reply. The avionics process the reply and determine the slant range between the aircraft and the ground station. Separate funding segments and acquisition projects have been established for two generic classes of DME ground stations: High power (en route) DMEs, and low power (terminal) DMEs. This mechanism addresses the high power DMEs.

DMEs may be provided alone, but are more often collocated with a VOR to form a VOR/DME facility, allowing aircraft to determine both the bearing and slant range to the ground station - and hence a navigational position fix. DMEs are approved as a primary navigation system in the NAS. The DME function is frequently provided by the TACAN system that also provides azimuth guidance to military users. (DME and the distance-measuring portion of TACAN are functionally the same.) When combined with a VOR, these facilities are called VORTACs.

The DME network will be sustained to support en route navigation and to serve as an independent backup navigation source to GPS and GPS/WAAS. The DME network may also need to be expanded to provide a redundant area navigation (RNAV) capability for terminal area operations at major airports.

Distance Measuring Equipment Avionics

Distance Measuring Equipment Avionics (DME Avionics) receives, processes and displays for the pilot the distance data provided by ground-based DMEs.

Domestic Reduced Vertical Separation Minimum Altimeter

Domestic Reduced Vertical Separation Minimum Altimeter (Domestic RVSM Alt) is a source of altitude data or information that was added to support the RVSM capability. It consists of two independent altimeters with enhanced transducers or double aneroid sensors for computing altitude. The altitude source is connected through the static system to provide an automatic means correcting the known static source error of aircraft to improve aircraft altitude measurement capability. Domestic RVSM Alt may also be used to satisfy Oceanic RVSM and the altitude sensor may be included within an air data computer.

Flight Management System

Flight Management System (FMS) is a computer system that uses a large database to allow routes to be preprogrammed and stored. The system is constantly updated with respect to position accuracy by reference to one or more conventional radio navigation aids (i.e., multi-sensor systems). The system may also use information from an inertial reference unit (IRU) or from a stand-alone inertial navigation system (INS). A sophisticated program and its associated database ensure that the most appropriate navaids are automatically selected during the update cycle. FMSs combine the relative position information from two or more point-referenced navigation aids such as VOR or DME to determine the absolute position of the aircraft (latitude, longitude). The resulting Area Navigation (RNAV) capability permits operation on any desired course.

Global Positioning System (key system)

The Global Positioning System (GPS) is a worldwide, all-weather, satellite-based navigation system developed, maintained & operated by the U.S Department of Defense, and managed by an Interagency executive board. GPS is a (nominal) 24 satellite constellation orbiting at approximately 12,000 miles above the earth in six planes. Each satellite broadcasts a precisely timed L-band signal on the same frequency. User GPS receivers, oboard aircraft, in ground vehicles or hand-held, receive and process the signals from all satellites in view, with a minimum of four satellites necessary to determine the receiver''s three-dimensional position (i.e., latitude, longitude and altitude), velocity (if applicable) and the precise time of day. GPS equipped aircraft can navigate on published jetways or utilize Area Navigation (RNAV) to fly any desired course between two locations.

GPS avionics built to TSO C-129 support en route and terminal area navigation, as well as non-precision instrument approach operations. Approval has been granted for properly certified GPS avionics to be used as a primary means of navigation in oceanic airspace and in certain remote areas. In July 2003 the Wide Area Augmentation System (WAAS)was commissioned to augment the GPS signal to meet primary navigation service requirements for accuracy, coverage, availability, and integrity.

Global Positioning System Avionics (key system)

Global Positioning System (GPS) Avionics process the signals received from four or more GPS satellites and determine the three-dimensional position (i.e., latitude, longitude and altitude) and velocity of an aircraft, as well as the precise time of day. GPS avionics provide an Area Navigation (RNAV) capability that permits operation on any desired course.

GPS avionics built to TSO-C129 do not have augmentation (WAAS, LAAS) and are approved only as a supplemental navigation system in the NAS, meaning that they must be used in conjunction with a primary navigation system. TSO-C129 avionics support en route and terminal area navigation, as well as non-precision instrument approach operations. Approval has been granted for properly certified GPS avionics to be used as a primary means of navigation in oceanic airspace and in certain remote areas. In certain regions of the world (including the NAS), GPS will be augmented (Wide Area and Local Area systems) to satisfy additional requirements for accuracy, coverage, availability, and integrity. Augmented GPS avionics (WAAS, LAAS) are expected to support precision instrument approach operations, and to gain approval as a primary navigation system throughout the NAS. It is anticipated that users will migrate from TSO-C129 avionics to augmented GPS avionics (WAAS, LAAS).

Inertial Navigation System Avionics

Inertial Navigation System Avionics (INS Avionics) is a self-contained system, comprised of gyroscopes, accelerometers, and a navigation computer, which provides navigation information in response to inertial effects on system components. An INS is typically aligned with accurate position information prior to departure, and thereafter calculates its position as it progresses to the destination. INS accuracy degrades with time, but can be aligned in flight using radio navigation system updates. Many inertial systems employ a sophisticated automatic update scheme using dual- Distance Measuring Equipment (DME), very high frequency (VHF) Omnidirectional Range VOR or other sensor inputs (e.g., Global Positioning System (GPS)).

INS may be approved as a primary navigation system or may be used in combination with other systems. By programming a series of waypoints, the system will navigate along a predetermined track. INS provides an Area Navigation (RNAV) capability that permits operation on any desired course.

Instrument Landing System Avionics

ILS Avionics are a composite of compass locator or ADF receivers, marker beacon, localizer, and glideslope receivers. Within the aircraft the respective receivers may be contained within one enclosure or separate enclosures ("black boxes") that provide position determination and precision approach guidance using signals from their respective ground-based transmitters.Marker beacon transmitters which broadcast on 75 MHz emit tones with respect to their location for detection by the marker beacon receiver which in turn propagates an audio signal and annunciates a lamp indication in the cockpit of the area of passage over each transmitter. Respectively the outer marker (OM) emits a 400 Hz tone, while the middle marker (MM) emits a 1300 Hz tone. The inner marker (IM), consistent with a fan marker emits a 3000 Hz tone. Each tone is discernible both by frequency as well as periodicity.Localizer transmitters operate on one of the 40 ILS channels within the frequency range of 108.10 to 111.95 MHz. Modulated tones produced by he Localizer transmitter that are detected by the VHF navigation receiver and displayed as lateral deviation guidance emitted from the centerline of the runway.Glide slope transmitters operate on one of the 40 ILS channels, typically paired with Localizer frequencies but emit modulated tones on carrier frequencies from 329.3 to 335.0 MHz. Modulated tones are detected by the glide slope receiver and displayed as vertical guidance emitted in the proximity of the touchdown zone of the runway.Compass locators are another component of the IILS having transmitters located at the MM and OM sites. The transmitters have a power of less than 25 watts, a range of at least 15 miles and operate between 190 and 535 kHz. At some locations, higher powered radio beacons, up to 400 watts, are used as OM compass locators. These generally carry Transcribed Weather Broadcast (TWEB) information. Compass locators transmit two letter identification groups. The outer locator transmits the first two letters of the localizer identification group, and the middle locator transmits the last two letters of the localizer identification group.

Instrument Landing System Category I

Category (CAT) I Instrument Landing Systems (ILS) support precision landing operations for visibility conditions equal to or greater than a 200 feet decision height above the runway threshold and a touchdown zone runway visual range of at least 1,800 feet.

All ILS radiate runway approach guidance, i.e., alignment and descent information, to aircraft on final approach to a runway. Equipment-wise an ILS consists of a highly directional localizer located at the far end of the runway, a glide slope located near, and offset from, the approach end of the runway. Marker beacons located along the runway''s approach course provide visual and aural indications in the cockpit that indicate the aircraft''s distance from the runway threshold. Marker beacons can be supplanted or replaced by Distance Measuring Equipment (DME) that is typically co-located with the localizer station. The presence and utilization of a DME to aid in making a precision approach is included in the approach procedure for the runway.

ILS feature integral monitoring of the radiated signals to ensure that the radiated guidance is within specified operating tolerances to ensure the signal-in-space approach guidance is safe. They also possess remote maintenance monitoring (RMM) to support remote access and monitoring of the operating status of each ILS station.

Instrument Landing System Category II/III

Category (CAT) II Instrument Landing Systems (ILS) support precision landing operations for 100 foot decision heights and a touchdown zone runway visual range (RVR) of at least 1200 feet. CAT III ILS support precision approaches with decision heights of 50 or less feet and touchdown zone RVR less than 700 feet.

All ILS radiate runway approach guidance, i.e., alignment and descent information, to aircraft on final approach to a runway. Equipment-wise an ILS consists of a highly directional localizer located at the far end of the runway, a glide slope located near, and offset from, the approach end of the runway, and marker beacons located along the approach course that provide visual and aural information on how far the aircraft is from the runway threshold. ILS marker beacons can be supplanted or replaced by Distance Measuring Equipment (DME) that is typically co-located with the localizer station. The presence and utilization of a DME to aid in making a precision approach is included in the approach procedure for the runway.

ILS feature integral monitoring of the radiated signals to ensure that the radiated guidance is within specified operating tolerances to ensure the signal-in-space approach guidance is safe. They also possess remote maintenance monitoring (RMM) to support remote access and monitoring of the operating status of each ILS station.

The Local Area Augmentation System (LAAS) may eventually support CAT II/III service. In the interim precision landing services will continue to be provided using ILS technology, which requires that the older population of the current ILS inventory must be either replaced or upgraded (modernized) via a service life extension program.

Lead-in-light System

A Lead-in-light System (LDIN) consists of one or more series of flashing lights installed at or near ground level that provides positive visual guidance along an approach path, either curving or straight, where special problems exist with hazardous terrain, obstructions, or noise abatement procedures.

Localizer (key system)

The component of an ILS that provides lateral course guidance to the runway. Localizer will provide non-precision approach capability with appropriate lead-in lights.

Localizer Type Directional Aid

The Localizer-type Directional Aid (LDA) is of comparable use and accuracy to a localizer but is not part of a complete ILS. The LDA course usually provides a more precise approach course than the similar Simplified Directional Facility (SDF) installation, which may have a course width of 6 or 12 degrees.

The LDA is not aligned with the runway. Straight-in minimums may be published where alignment does not exceed 30 degrees between the course and runway. Circling minimums only are published where this alignment exceeds 30 degrees.

Medium-Intensity Approach Light System with Runway Alignment Indicator Lights

The Medium-Intensity Approach Light System with Runway Alignment Indicator Lights (MALSR) supports Category I instrument approaches. It is a medium intensity light system that identifies the extended runway centerline from threshold to 2,400 feet before the threshold. The MALSR supports Category I instrument approaches and presents to the pilot the illusion of a ball of light traveling from the outer end of the system to a point approximately 1,400 feet from the end of the runway. A row of green lights marks the threshold of the runway.

MALSF and MALS are subsets of MALSR. A MALSR has 45 lights, 5 flashers, and is 2400 ft in length. A MALSF has 45 lights, 3 flashers, and is 1400 ft in length. MALS has 45 lights, no flashers, and is 1400 ft in length.

Medium-Intensity Approach Light System with Runway Alignment Indicator Lights Next Generation

The Medium-Intensity Approach Light System with Runway Alignment Indicator Lights (RAIL) Next Generation (MALSR NEXGEN) is an array of medium-intensity lights marking the extended runway centerline for approaching aircraft. The RAIL begins 2400 feet from threshold and extends 1000 feet. The MALSR supports Category I instrument approaches and presents the illusion of a ball of light leading towards the runway. The MALS portion of the MALSR begins 1400 feet from threshold and ends 200 feet from threshold. A row of green lights marks the threshold of the runway.

Medium-Intensity Light System with Runway Alignment Indicator Lights Technology Refresh

The Medium-Intensity Light System with Runway Alignment Indicator Lights Technology Refresh (MALSR Tech Refresh) is an array of high intensity Light Emitting Diode (LED) lights marking the extended runway centerline for 2,400 to 3,000 feet from the runway threshold. The MALSR supports Category I instrument approaches and presents to the pilot the illusion of a ball of light traveling from the outer end of the system to a point about 1,400 feet from the end of the runway. An indicator marks a point 1,000 feet from the end of the runway. A row of green lights indicates the threshold of the runway.

Microwave Landing System

. The MLS provides precision navigation guidance for exact alignment and descent of aircraft on approach to a runway. It provides azimuth, elevation, and distance.2. Both lateral and vertical guidance may be displayed on conventional course deviation indicators or incorporated into multipurpose cockpit displays. Range information can be displayed by conventional DME indicators and also incorporated into multipurpose displays.3. The MLS supplements the ILS as the standard landing system in the United States for civil, military, and international civil aviation. At international airports, ILS service is protected to 2010.4. The system may be divided into five functions: (a) Approach azimuth, (b) Back azimuth, (c) Approach elevation, (d) Range, and (e) Data communications.5. The standard configuration of MLS ground equipment includes: (a) An azimuth station to perform functions (a) and (e) above. In addition to providing azimuth navigation guidance, the station transmits basic data, which consists of information associated directly with the operation of the landing system, as well as advisory data on the performance of the ground equipment. (b) An elevation station to perform function (c). (c) Distance Measuring Equipment (DME) to perform range guidance, both standard DME (DME/N) and precision DME (DME/P).6. MLS Expansion Capabilities: The standard configuration can be expanded by adding one or more of the following functions or characteristics. (a) Back azimuth: Provides lateral guidance for missed approach and departure navigation. (b) Auxiliary data transmissions: Provides additional data, including refined airborne positioning, meteorological information, runway status, and other supplementary information. (c) Expanded Service Volume (ESV) proportional guidance to 60 degrees.7. MLS identification is a four-letter designation starting with the letter M. It is transmitted in International Morse Code at least six times per minute by the approach azimuth (and back azimuth) ground equipment.b. Approach Azimuth Guidance1. The azimuth station transmits MLS angle and data on one of 200 channels within the frequency range of 5031 to 5091 MHz.2. The equipment is normally located about 1,000 feet beyond the stop end of the runway, but there is considerable flexibility in selecting sites. For example, for heliport operations the azimuth transmitter can be collocated with the elevation transmitter.3. The azimuth coverage extends: (a) Laterally, at least 40 degrees on either side of the runway centerline in a standard configuration, (b) In elevation, up to an angle of 15 degrees and to at least 20,000 feet, and(c) In range, to at least 20 NM.

Non-Directional Beacon (key system)

Non-Directional Beacons (NDB) are low frequency (LF) or medium frequency (MF) ground-based radio navigation aids that broadcast a continuous wave (CW) signal with a Morse code identification on an assigned frequency signal. NDBs are used by pilots to determine the aircraft''s bearing to the ground station. Some state-owned and locally owned NDBs are also used to provide weather information to pilots.

NDBs can be used for non-precision approaches at low traffic airports, as compass locators (locator outer markers (LOMs)) to aid a pilot in finding the initial approach point of an Instrument Landing System (ILS), and for en route operations in remote areas. NDBs are approved as a primary navigation system in the National Airspace System (NAS).

Omnidirectional Approach Lighting System

The Omnidirectional Approach Lighting System (ODALS) is a system of sequenced flashing lights marking the extended runway centerline for 1,500-feet. Indicators placed at the end of the runway mark each edge of the runway.

Precision Approach Path Indicator

The Precision Approach Path Indicator (PAPI) provides precision visual glide slope guidance to pilots landing in Visual Flight Rules (VFR) conditions. The PAPI consists of four sharp transition projector units located on one side of the runway, spaced laterally at 29.5-foot intervals.

Radar Altimeter Avionics

Radar or Radio Altimeter (RADALT) avionics makes use of the reflection of radio waves from the ground to provide absolute altitude indications to the pilot, as well as altitude inputs to automatic flight control systems and to Traffic Alert and Collision Avoidance Systems (TCAS) for various functions, and is required to conduct Category II and III precision instrument approaches.

Runway Alignment Indicator Lights

Runway Alignment Indicator Lights (RAIL) are a series of sequenced flashing lights that are installed only in combination with other lighting systems.

Runway Centerline Lighting

Runway Centerline Lighting (RWCLL) consists of flush centerline lights spaced at 50-foot intervals beginning 75 feet from the landing threshold and extending to within 75 feet of the opposite end of the runway.

Runway End Identifier Lighting (Next Generation)

Runway End Identifier Lights (REIL) (Next Generation) is the next generation of an airport lighting facility in the terminal area navigation system, consisting of one flashing white high intensity light installed at each approach end corner of a runway and directed towards the approach zone, which enables the pilot to identify the approach end of the runway.

Runway End Identifier Lights

Runway End Identifier Lights (REIL) is an airport lighting system consisting of two flashing, white, high intensity lights located at each approach end corner of a runway. The REILs are directed towards the approach zone to enable pilots to identify the end of the runway.

Runway Lights/Runway Edge Lights

Runway Lights/Runway Edge Lights (RL/REL) are lights having a prescribed angle of emission used to define the lateral limits of a runway. Runway lights are uniformly spaced at intervals of approximately 200-feet, and the intensity may be controlled or preset.

Runway lights and ruuway edge lights are procured, installed, and maintained by the airport. The FAA is not involved with these light systems other than publishing the necssary lighting standards which the airport uses for guidance.

Short Approach Lighting System

A Short Approach Lighting System (SALS) is an array of high-intensity lights marking the extended runway centerline for 2,400 to 3,000 feet from the runway threshold. The system presents to the pilot the illusion of a ball of light traveling from the outer end of the system to a point 1,000 feet from the end of the runway. Two additional rows of lights indicate the edges of the runway for the last 1,000 feet with special indicators placed 1,000 feet, 500 feet and at the runway threshold.

Short Approach Lighting System with Sequenced Flashing Lights

Short Approach Lighting System with Sequenced Flashing Lights (SALSF) is an array of high intensity lights marking the extended runway centerline for 1,500 feet. The system presents to the pilot the illusion of a ball of light traveling from the outer end of the system to a point 1,000 feet from the end of the runway. Indicators placed at the end of the runway mark the center and each edge of the runway. An additional indicator marks a point 1,000 feet from the end of the runway.

Simplified Directional Facility

Simplified Directional Facility (SDF) is a navigational aid (NAVAID) used for nonprecision instrument approaches. The final approach course is similar to that of an Instrument Landing System (ILS) localizer for lateral guidance to the approach procedure decision threshold. However, the SDF course may be offset from the runway, generally not more than 3 degrees, and the course may be wider than the localizer, resulting in a lower degree of accuracy. A glide slope path is not provided. The SDF signal is fixed at either 6 degrees or 12 degrees as necessary to provide maximum flyability and optimum course quality. Identification consists of a three-letter identifier transmitted in Morse code on the SDF frequency. The appropriate instrument approach chart will indicate the identifier used at a particular airport. The SDF transmits signals within the range of 108.10 to 111.95 MHz. The approach techniques and procedures used in an SDF instrument approach are essentially the same as those employed in executing a standard localizer approach except the SDF course may not be aligned with the runway and the course may be wider, resulting in less precision.

Simplified Short Approach Light System with Runway Alignment Indicator Lights

The Simplified Short Approach Light System with Runway Alignment Indicator Lights (SSALR) is a SSALS facility with sequence flashers installed from 1,600 to 2,400 feet from the runway threshold. Normal spacing between lights is 200 feet. This system assists pilots in transitioning from precision approach Instrument Flight Rules (IFR) to Visual Flight Rules (VFR) for landing.

Simplified Short Approach Lighting System

The Simplified Short Approach Lighting System (SSALS) is an array of medium-intensity lights marking the extended runway centerline for 1,400 feet. A special indicator marks a point 1,000 feet from the end of the runway. A row of green lights indicates the threshold runway.

Simplified Short Approach Lighting System with Sequenced Flashing Lights

The Simplified Short Approach Lighting System with Sequenced Flashing Lights (SSALF) is a system of medium-intensity lights marking the extended runway centerline for 1,400 feet. The system presents to the pilot the illusion of a ball of light traveling from the outer end of the system (1,400 feet) to a point 1,000 feet from the end of the runway. A special indicator marks a point 1,000 feet from the end of the runway. A row of green lights indicates the threshold runway.

Tactical Air Navigation Avionics

Tactical Air Navigation Avionics (TACAN Avionics) provide both the bearing and distance to the ground station - and hence a navigational position fix. Many avionics models include an air-to-air mode that enables aircraft to determine distance from each other, which can be particularly useful in rendezvous operations. TACAN is approved as a primary navigation system in the NAS for military and naval operations.

DoD plans to equip military aircraft with GPS. However, with the planned retention of TACAN ground systems as a backup to GPS, TACAN avionics are expected to remain in service indefinitely in some classes of military aircraft.

Tactical Air Navigation System (key system)

Tactical Air Navigation (TACAN) is a UHF (ultra high frequency) ground-based radio navigation aid that is the military counterpart of VHF Omnidirectional Range co-located with Distance Measuring Equipment (VOR/DME). TACAN avionics provide both the bearing and slant range to the ground station - and hence a navigation position fix. TACAN is often collocated with civil VOR systems to form a VORTAC to support military aircraft operations. TACAN is approved as a primary navigation system in the National Airspace System (NAS).

Touchdown Zone Lighting

A Touchdown Zone Lighting (TDZL) consists of two rows of transverse light bars located symmetrically about the runway centerline normally at 100-foot intervals. The basic system extends 3,000 feet along the runway.

Very High Frequency Omnidirectional Range (key system)

The Very High Frequency Omnidirectional Range (VOR) is a ground-based radio navigation aid that broadcasts azimuth information to aircraft. VORs broadcast on assigned channels and include the facility identification in Morse code for pilot monitoring and verification. Some VORs are capable of broadcasting weather information and supporting pilot-controller communcations although these capabilities are typically provided by other infrastructure systems. In addition to providing en route and terminal area azimuth guidance, VORs also support nonprecision instrument approach operations.

Currently, VORs are the primary radio navigation aid in the National Airspace System (NAS). They serve as the internationally designated standard short-distance radio navigation aid for air carrier and general aviation Instrument Flight Rules (IFR) operations.

VORs may be installed stand-alone or co-located with either a DME or TACAN system. When co-located the facility is typically referred to as a VOR/DME or VORTAC facility, respectively. This configuration allows pilots to determine their aircraft''s bearing and distance to a single location, i.e., fix.

With the advent of space-based navigation capabilities, a planned reduction in operational VORs will begin in approximately 2010. The reduction will result in a "backbone" minimum operational network (MON) that will support IFR operations at the busiest airports in the NAS while serving as a backup for space-based navigation.

Very High Frequency Omnidirectional Range Avionics

Very High Frequency Omnidirectional Range Avionics (VOR Avionics) receive, process, and display for the pilot the azimuth (bearing) to or from ground-based VOR transmitters.

Increasing numbers of aircraft are being equipped with GPS or WAAS avionics. However, since a reduced network of VOR stations is planned to continue in operation indefinitely as a backup to GPS, VOR avionics are expected to remain in service indefinitely in some aircraft.

Visual Approach Slope Indicator (key system)

A Visual Approach Slope Indicator (VASI) system is a light system that is accurately located alongside a runway to provide a visual glide slope to landing aircraft. VASIs radiate a directional pattern of high intensity, red and white focused light beams to form the glide path and are utilized primarily under Visual Flight Rules (VFR) conditions.

WAAS Corrections Broadcast Service

WAAS Corrections Broadcast Service is comprised of both Space-based and Ground Earth Station components.

Geostationary Earth Orbit (GEO) satellites receive Wide Area Augmentation System (WAAS) correction and integrity information transmitted by Ground Earth Stations (in WAAS terms referred to as Ground Uplink Stations (GUSs)) with information re-broadcast for WAAS avionics reception and use. Current broadcast service leased from INMARSAT".

Wide Area Augmentation System

The Wide Area Augmentation System (WAAS) consists of a distributed array of Reference and Master Stations designed to provide range correction and integrity information messages that are used by WAAS-capable Global Positioning System (GPS)avionics to accurately determine an aircraft''s 3-dimensional position in space. Accurately surveyed WAAS Reference Stations (WRS) receive and process GPS satellite range data which is forwarded to redundant WAAS Master Stations (WMS) for additional processing before sending the resulting range-correction data to redundant WAAS Ground Uplink Stations (GUS). The GUS transmit the data to Geostationary (GEO) satellites which retransmit them on a GPS civil-use frequency for reception by GPS/WAAS avionics. The WAAS data enables aircraft to determine their position in the airspace with an accuracy that will enable, for WAAS-equipped aircraft, introduction of advanced navigation initiatives such as precision and non-precision approaches to airports throughout the NAS, and reduced longitudinal separation.

The WAAS service volume includes the contiguous United States, Hawaii, portions of Alaska and the Caribbean, and the US border areas with Canada and Mexico. Planned enhancement of WAAS with additional WRS and GEO satellites will improve the coverage and availability of WAAS. Enhancement of the GPS by the Department of Defense (DoD) will provide a second civil frequency for WAAS that will provide additional improvements in navigation performance throughout the NAS. This latter version of the WAAS will be termed the GPS Landing System (GLS).

Wide Area Augmentation System Avionics

Airborne Navigation Sensors Using the Global Positioning System (GPS) Augmented by the Wide Area Augmentation System (WAAS) combines navigation solutions from time and pseudoranges provided by the DoD Global Positioning

System (GPS) satellites within view of the aircraft and pseudoranges provided by the Wide Area Augmentation (WAAS) geostationary satellites in view to compute navigation guidance with respect to courses selected by the flight crew. GPS/WAAS Avionics are approved for use as a primary means of navigation within the CONUS, where available, to satisfy en route, terminal area, and non-precision approaches providing lateral course guidance only. Lateral Navigation (LNAV)/Vertical Navigation (VNAV) non-precision approaches to lower minima are feasible using baro-altimeter avionics inputs. Lateral with Precision Vertical (LPV) guidance using GPS/WAAS Avionics to satisfy near Category I precision approaches with higher minima than ILS is also feasible, when approved under SIAP.

People

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Interfaces

Global Positioning System — (Position Data) → Global Positioning System Avionics

GPS Avionics equipment provides position data by accurately measuring clock and pseudorange data from GPS satellites.

Issues

None

Service Group Air Traffic Services

Service Navigation

Capability Airborne Guidance

Operational Improvement

Current Precision Approach, Landing and Departure (107104)

Ground-based instrument landing systems support precision approach and landings for Category I, II and III visibility and decision height minimums. These landing systems radiate precision lateral and vertical descent guidance signals that are received and processed by aircraft navigation avionics to guide the aircraft to the runway. Precision approach systems can be supplanted with marker beacons, which indicate the distance from the aircraft current position to the runway threshold, and Distance Measuring Equipment (DME).

14-Sep-1997 to 14-Sep-2020

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Ground-based instrument landing systems support precision approach and landing for Category I, II and III visibility to decision altitude minimums. These instrument landing systems radiate precision lateral and vertical descent guidance signals that are received and processed by aircraft avionics and pilots to guide the aircraft to the runway. Precision instrument landing systems can be augmented with Marker Beacon facilities, which, when signals are received by the Marker Beacon avionics indicate the aircraft□s approximate position along the approach path, and NDB signals when received by ADF Avionics provide azimuth guidance. DME avionics provide precise measure of distance to the runway threshold for landing or missed approach, or for departure distance from a DME facilitated airport. All instrument approaches require approved runway lighting facilities.

Benefits

Current operations are provided in the NAS.

Systems

Approach Lighting System with Sequenced Flashers Model 2 (key system)

Approach Lighting System with Sequenced Flashers, Model 2 (ALSF-2) is a 2400 foot long array of high intensity incandescent lamps and flashers located on the final approach to a runway and are provided to support Catetory II and III instrument approaches. The ALSF-2 assists pilots transition from low visibility Instrument Meteorological Conditions (IMC) to visual conditions for landing. A row of green lights marks the runway threshold.

These ALSF-2 systems represent the current acquisition of NBP type systems.

Approach Lighting System with Sequenced Flashing Lights Model 1

The Approach Lighting System with Sequenced Flashing Lights Model 1 (ALSF-1) is a system of high-intensity lights marking the extended runway centerline for 2,400 to 3,000 feet from the runway threshold. A row of green indicators mark the runway threshold.

ALSF-1 are very old systems and, when funded, will be replaced with current technology MALSR or ALSF-2 systems depending on whether the runway will support Cat I instrument approaches (MALSR) or Cat II/III instrument approaches (ALSF-2).

Automatic Direction Finder

Automatic Direction Finder (ADF) - An aircraft radio navigation system which senses and indicates the direction to a L/MF nondirectional radio beacon (NDB) ground transmitter. Direction is indicated to the pilot as a magnetic bearing or as a relative bearing to the longitudinal axis of the aircraft depending on the type of indicator installed in the aircraft. In certain applications, such as military, ADF operations may be based on airborne and ground transmitters in the VHF/UHF frequency spectrum.

Baro-Altimeter Avionics

Baro-Altimeter Avionics (Baro-Alt Avionics NAV) is a barometrically correctable pressure actuated sensing altimeter that utilizes the change of atmospheric pressure to measure altitude above mean sea level (MSL). The altimeter senses pressure changes and displays altitude in feet or meters. Since changes in air pressure directly affect the accuracy of the altitude readout, the altimeter is equipped with an adjustable barometric scale. If capable, Baro-Alt Avionics may provide electrical output to encode a transponder for altitude reporting purposes and/or to use as an input to GPS Avionics or GPS/WAAS Avionics to compensate for deficiency in required satellites to calculate Receiver Autonomous Integrity Monitoring (RAIM) function required for en route through non-precision approaches.

Distance Measuring Equipment (key system)

Distance Measuring Equipment (DME) is a UHF (Ultra High Frequency) ground-based radio navigation aid. DME avionics transmit interrogation pulses, and the ground-based responder sends a reply. The avionics process the reply and determine the slant range between the aircraft and the ground station. Separate funding segments and acquisition projects have been established for two generic classes of DME ground stations: High power (en route) DMEs, and low power (terminal) DMEs. This mechanism addresses the high power DMEs.

DMEs may be provided alone, but are more often collocated with a VOR to form a VOR/DME facility, allowing aircraft to determine both the bearing and slant range to the ground station - and hence a navigational position fix. DMEs are approved as a primary navigation system in the NAS. The DME function is frequently provided by the TACAN system that also provides azimuth guidance to military users. (DME and the distance-measuring portion of TACAN are functionally the same.) When combined with a VOR, these facilities are called VORTACs.

The DME network will be sustained to support en route navigation and to serve as an independent backup navigation source to GPS and GPS/WAAS. The DME network may also need to be expanded to provide a redundant area navigation (RNAV) capability for terminal area operations at major airports.

Distance Measuring Equipment Avionics

Distance Measuring Equipment Avionics (DME Avionics) receives, processes and displays for the pilot the distance data provided by ground-based DMEs.

Domestic Reduced Vertical Separation Minimum Altimeter

Domestic Reduced Vertical Separation Minimum Altimeter (Domestic RVSM Alt) is a source of altitude data or information that was added to support the RVSM capability. It consists of two independent altimeters with enhanced transducers or double aneroid sensors for computing altitude. The altitude source is connected through the static system to provide an automatic means correcting the known static source error of aircraft to improve aircraft altitude measurement capability. Domestic RVSM Alt may also be used to satisfy Oceanic RVSM and the altitude sensor may be included within an air data computer.

Flight Management System

Flight Management System (FMS) is a computer system that uses a large database to allow routes to be preprogrammed and stored. The system is constantly updated with respect to position accuracy by reference to one or more conventional radio navigation aids (i.e., multi-sensor systems). The system may also use information from an inertial reference unit (IRU) or from a stand-alone inertial navigation system (INS). A sophisticated program and its associated database ensure that the most appropriate navaids are automatically selected during the update cycle. FMSs combine the relative position information from two or more point-referenced navigation aids such as VOR or DME to determine the absolute position of the aircraft (latitude, longitude). The resulting Area Navigation (RNAV) capability permits operation on any desired course.

Global Positioning System

The Global Positioning System (GPS) is a worldwide, all-weather, satellite-based navigation system developed, maintained & operated by the U.S Department of Defense, and managed by an Interagency executive board. GPS is a (nominal) 24 satellite constellation orbiting at approximately 12,000 miles above the earth in six planes. Each satellite broadcasts a precisely timed L-band signal on the same frequency. User GPS receivers, oboard aircraft, in ground vehicles or hand-held, receive and process the signals from all satellites in view, with a minimum of four satellites necessary to determine the receiver''s three-dimensional position (i.e., latitude, longitude and altitude), velocity (if applicable) and the precise time of day. GPS equipped aircraft can navigate on published jetways or utilize Area Navigation (RNAV) to fly any desired course between two locations.

GPS avionics built to TSO C-129 support en route and terminal area navigation, as well as non-precision instrument approach operations. Approval has been granted for properly certified GPS avionics to be used as a primary means of navigation in oceanic airspace and in certain remote areas. In July 2003 the Wide Area Augmentation System (WAAS)was commissioned to augment the GPS signal to meet primary navigation service requirements for accuracy, coverage, availability, and integrity.

Instrument Landing System Avionics (key system)

ILS Avionics are a composite of compass locator or ADF receivers, marker beacon, localizer, and glideslope receivers. Within the aircraft the respective receivers may be contained within one enclosure or separate enclosures ("black boxes") that provide position determination and precision approach guidance using signals from their respective ground-based transmitters.Marker beacon transmitters which broadcast on 75 MHz emit tones with respect to their location for detection by the marker beacon receiver which in turn propagates an audio signal and annunciates a lamp indication in the cockpit of the area of passage over each transmitter. Respectively the outer marker (OM) emits a 400 Hz tone, while the middle marker (MM) emits a 1300 Hz tone. The inner marker (IM), consistent with a fan marker emits a 3000 Hz tone. Each tone is discernible both by frequency as well as periodicity.Localizer transmitters operate on one of the 40 ILS channels within the frequency range of 108.10 to 111.95 MHz. Modulated tones produced by he Localizer transmitter that are detected by the VHF navigation receiver and displayed as lateral deviation guidance emitted from the centerline of the runway.Glide slope transmitters operate on one of the 40 ILS channels, typically paired with Localizer frequencies but emit modulated tones on carrier frequencies from 329.3 to 335.0 MHz. Modulated tones are detected by the glide slope receiver and displayed as vertical guidance emitted in the proximity of the touchdown zone of the runway.Compass locators are another component of the IILS having transmitters located at the MM and OM sites. The transmitters have a power of less than 25 watts, a range of at least 15 miles and operate between 190 and 535 kHz. At some locations, higher powered radio beacons, up to 400 watts, are used as OM compass locators. These generally carry Transcribed Weather Broadcast (TWEB) information. Compass locators transmit two letter identification groups. The outer locator transmits the first two letters of the localizer identification group, and the middle locator transmits the last two letters of the localizer identification group.

Instrument Landing System Category I (key system)

Category (CAT) I Instrument Landing Systems (ILS) support precision landing operations for visibility conditions equal to or greater than a 200 feet decision height above the runway threshold and a touchdown zone runway visual range of at least 1,800 feet.

All ILS radiate runway approach guidance, i.e., alignment and descent information, to aircraft on final approach to a runway. Equipment-wise an ILS consists of a highly directional localizer located at the far end of the runway, a glide slope located near, and offset from, the approach end of the runway. Marker beacons located along the runway''s approach course provide visual and aural indications in the cockpit that indicate the aircraft''s distance from the runway threshold. Marker beacons can be supplanted or replaced by Distance Measuring Equipment (DME) that is typically co-located with the localizer station. The presence and utilization of a DME to aid in making a precision approach is included in the approach procedure for the runway.

ILS feature integral monitoring of the radiated signals to ensure that the radiated guidance is within specified operating tolerances to ensure the signal-in-space approach guidance is safe. They also possess remote maintenance monitoring (RMM) to support remote access and monitoring of the operating status of each ILS station.

Instrument Landing System Category II/III (key system)

Category (CAT) II Instrument Landing Systems (ILS) support precision landing operations for 100 foot decision heights and a touchdown zone runway visual range (RVR) of at least 1200 feet. CAT III ILS support precision approaches with decision heights of 50 or less feet and touchdown zone RVR less than 700 feet.

All ILS radiate runway approach guidance, i.e., alignment and descent information, to aircraft on final approach to a runway. Equipment-wise an ILS consists of a highly directional localizer located at the far end of the runway, a glide slope located near, and offset from, the approach end of the runway, and marker beacons located along the approach course that provide visual and aural information on how far the aircraft is from the runway threshold. ILS marker beacons can be supplanted or replaced by Distance Measuring Equipment (DME) that is typically co-located with the localizer station. The presence and utilization of a DME to aid in making a precision approach is included in the approach procedure for the runway.

ILS feature integral monitoring of the radiated signals to ensure that the radiated guidance is within specified operating tolerances to ensure the signal-in-space approach guidance is safe. They also possess remote maintenance monitoring (RMM) to support remote access and monitoring of the operating status of each ILS station.

The Local Area Augmentation System (LAAS) may eventually support CAT II/III service. In the interim precision landing services will continue to be provided using ILS technology, which requires that the older population of the current ILS inventory must be either replaced or upgraded (modernized) via a service life extension program.

Lead-in-light System

A Lead-in-light System (LDIN) consists of one or more series of flashing lights installed at or near ground level that provides positive visual guidance along an approach path, either curving or straight, where special problems exist with hazardous terrain, obstructions, or noise abatement procedures.

Localizer

The component of an ILS that provides lateral course guidance to the runway. Localizer will provide non-precision approach capability with appropriate lead-in lights.

Medium-Intensity Approach Light System with Runway Alignment Indicator Lights (key system)

The Medium-Intensity Approach Light System with Runway Alignment Indicator Lights (MALSR) supports Category I instrument approaches. It is a medium intensity light system that identifies the extended runway centerline from threshold to 2,400 feet before the threshold. The MALSR supports Category I instrument approaches and presents to the pilot the illusion of a ball of light traveling from the outer end of the system to a point approximately 1,400 feet from the end of the runway. A row of green lights marks the threshold of the runway.

MALSF and MALS are subsets of MALSR. A MALSR has 45 lights, 5 flashers, and is 2400 ft in length. A MALSF has 45 lights, 3 flashers, and is 1400 ft in length. MALS has 45 lights, no flashers, and is 1400 ft in length.

Medium-Intensity Light System with Runway Alignment Indicator Lights Technology Refresh

The Medium-Intensity Light System with Runway Alignment Indicator Lights Technology Refresh (MALSR Tech Refresh) is an array of high intensity Light Emitting Diode (LED) lights marking the extended runway centerline for 2,400 to 3,000 feet from the runway threshold. The MALSR supports Category I instrument approaches and presents to the pilot the illusion of a ball of light traveling from the outer end of the system to a point about 1,400 feet from the end of the runway. An indicator marks a point 1,000 feet from the end of the runway. A row of green lights indicates the threshold of the runway.

Microwave Landing System (key system)

. The MLS provides precision navigation guidance for exact alignment and descent of aircraft on approach to a runway. It provides azimuth, elevation, and distance.2. Both lateral and vertical guidance may be displayed on conventional course deviation indicators or incorporated into multipurpose cockpit displays. Range information can be displayed by conventional DME indicators and also incorporated into multipurpose displays.3. The MLS supplements the ILS as the standard landing system in the United States for civil, military, and international civil aviation. At international airports, ILS service is protected to 2010.4. The system may be divided into five functions: (a) Approach azimuth, (b) Back azimuth, (c) Approach elevation, (d) Range, and (e) Data communications.5. The standard configuration of MLS ground equipment includes: (a) An azimuth station to perform functions (a) and (e) above. In addition to providing azimuth navigation guidance, the station transmits basic data, which consists of information associated directly with the operation of the landing system, as well as advisory data on the performance of the ground equipment. (b) An elevation station to perform function (c). (c) Distance Measuring Equipment (DME) to perform range guidance, both standard DME (DME/N) and precision DME (DME/P).6. MLS Expansion Capabilities: The standard configuration can be expanded by adding one or more of the following functions or characteristics. (a) Back azimuth: Provides lateral guidance for missed approach and departure navigation. (b) Auxiliary data transmissions: Provides additional data, including refined airborne positioning, meteorological information, runway status, and other supplementary information. (c) Expanded Service Volume (ESV) proportional guidance to 60 degrees.7. MLS identification is a four-letter designation starting with the letter M. It is transmitted in International Morse Code at least six times per minute by the approach azimuth (and back azimuth) ground equipment.b. Approach Azimuth Guidance1. The azimuth station transmits MLS angle and data on one of 200 channels within the frequency range of 5031 to 5091 MHz.2. The equipment is normally located about 1,000 feet beyond the stop end of the runway, but there is considerable flexibility in selecting sites. For example, for heliport operations the azimuth transmitter can be collocated with the elevation transmitter.3. The azimuth coverage extends: (a) Laterally, at least 40 degrees on either side of the runway centerline in a standard configuration, (b) In elevation, up to an angle of 15 degrees and to at least 20,000 feet, and(c) In range, to at least 20 NM.

Non-Directional Beacon

Non-Directional Beacons (NDB) are low frequency (LF) or medium frequency (MF) ground-based radio navigation aids that broadcast a continuous wave (CW) signal with a Morse code identification on an assigned frequency signal. NDBs are used by pilots to determine the aircraft''s bearing to the ground station. Some state-owned and locally owned NDBs are also used to provide weather information to pilots.

NDBs can be used for non-precision approaches at low traffic airports, as compass locators (locator outer markers (LOMs)) to aid a pilot in finding the initial approach point of an Instrument Landing System (ILS), and for en route operations in remote areas. NDBs are approved as a primary navigation system in the National Airspace System (NAS).

Omnidirectional Approach Lighting System

The Omnidirectional Approach Lighting System (ODALS) is a system of sequenced flashing lights marking the extended runway centerline for 1,500-feet. Indicators placed at the end of the runway mark each edge of the runway.

Precision Approach Path Indicator (key system)

The Precision Approach Path Indicator (PAPI) provides precision visual glide slope guidance to pilots landing in Visual Flight Rules (VFR) conditions. The PAPI consists of four sharp transition projector units located on one side of the runway, spaced laterally at 29.5-foot intervals.

Radar Altimeter Avionics

Radar or Radio Altimeter (RADALT) avionics makes use of the reflection of radio waves from the ground to provide absolute altitude indications to the pilot, as well as altitude inputs to automatic flight control systems and to Traffic Alert and Collision Avoidance Systems (TCAS) for various functions, and is required to conduct Category II and III precision instrument approaches.

Runway Alignment Indicator Lights (key system)

Runway Alignment Indicator Lights (RAIL) are a series of sequenced flashing lights that are installed only in combination with other lighting systems.

Runway Centerline Lighting (key system)

Runway Centerline Lighting (RWCLL) consists of flush centerline lights spaced at 50-foot intervals beginning 75 feet from the landing threshold and extending to within 75 feet of the opposite end of the runway.

Runway End Identifier Lighting (Next Generation)

Runway End Identifier Lights (REIL) (Next Generation) is the next generation of an airport lighting facility in the terminal area navigation system, consisting of one flashing white high intensity light installed at each approach end corner of a runway and directed towards the approach zone, which enables the pilot to identify the approach end of the runway.

Runway End Identifier Lights (key system)

Runway End Identifier Lights (REIL) is an airport lighting system consisting of two flashing, white, high intensity lights located at each approach end corner of a runway. The REILs are directed towards the approach zone to enable pilots to identify the end of the runway.

Runway Lights/Runway Edge Lights (key system)

Runway Lights/Runway Edge Lights (RL/REL) are lights having a prescribed angle of emission used to define the lateral limits of a runway. Runway lights are uniformly spaced at intervals of approximately 200-feet, and the intensity may be controlled or preset.

Runway lights and ruuway edge lights are procured, installed, and maintained by the airport. The FAA is not involved with these light systems other than publishing the necssary lighting standards which the airport uses for guidance.

Runway Visual Range (key system)

Runway Visual Range (RVR) systems provide a standardized, instantaneous, and accurate method of measuring visibility along runways

Short Approach Lighting System

A Short Approach Lighting System (SALS) is an array of high-intensity lights marking the extended runway centerline for 2,400 to 3,000 feet from the runway threshold. The system presents to the pilot the illusion of a ball of light traveling from the outer end of the system to a point 1,000 feet from the end of the runway. Two additional rows of lights indicate the edges of the runway for the last 1,000 feet with special indicators placed 1,000 feet, 500 feet and at the runway threshold.

Short Approach Lighting System with Sequenced Flashing Lights

Short Approach Lighting System with Sequenced Flashing Lights (SALSF) is an array of high intensity lights marking the extended runway centerline for 1,500 feet. The system presents to the pilot the illusion of a ball of light traveling from the outer end of the system to a point 1,000 feet from the end of the runway. Indicators placed at the end of the runway mark the center and each edge of the runway. An additional indicator marks a point 1,000 feet from the end of the runway.

Simplified Short Approach Light System with Runway Alignment Indicator Lights

The Simplified Short Approach Light System with Runway Alignment Indicator Lights (SSALR) is a SSALS facility with sequence flashers installed from 1,600 to 2,400 feet from the runway threshold. Normal spacing between lights is 200 feet. This system assists pilots in transitioning from precision approach Instrument Flight Rules (IFR) to Visual Flight Rules (VFR) for landing.

Simplified Short Approach Lighting System

The Simplified Short Approach Lighting System (SSALS) is an array of medium-intensity lights marking the extended runway centerline for 1,400 feet. A special indicator marks a point 1,000 feet from the end of the runway. A row of green lights indicates the threshold runway.

Simplified Short Approach Lighting System with Sequenced Flashing Lights

The Simplified Short Approach Lighting System with Sequenced Flashing Lights (SSALF) is a system of medium-intensity lights marking the extended runway centerline for 1,400 feet. The system presents to the pilot the illusion of a ball of light traveling from the outer end of the system (1,400 feet) to a point 1,000 feet from the end of the runway. A special indicator marks a point 1,000 feet from the end of the runway. A row of green lights indicates the threshold runway.

Tactical Air Navigation System

Tactical Air Navigation (TACAN) is a UHF (ultra high frequency) ground-based radio navigation aid that is the military counterpart of VHF Omnidirectional Range co-located with Distance Measuring Equipment (VOR/DME). TACAN avionics provide both the bearing and slant range to the ground station - and hence a navigation position fix. TACAN is often collocated with civil VOR systems to form a VORTAC to support military aircraft operations. TACAN is approved as a primary navigation system in the National Airspace System (NAS).

Touchdown Zone Lighting

A Touchdown Zone Lighting (TDZL) consists of two rows of transverse light bars located symmetrically about the runway centerline normally at 100-foot intervals. The basic system extends 3,000 feet along the runway.

Transponder Landing System

The TLS is intended for private use only, no public procedures will be issued. The TLS is designed to provide approach guidance utilizing existing avionics: ILS localizer/glide slope and Mode 3 transponders. TLS special procedures require pilot training and limit operations to one aircraft approach at a time. Ground equipment consists of a transponder interrogator, sensor arrays to detect lateral and vertical position, and ILS frequency transmitters. The TLS detects the aircraft""s vertical and azimuth position by processing its transponder replies into appropriate localizer and glide slope signals which are broadcast to and displayed on the aircraft""s Course Deviation Indicator. The TLS broadcast guides the aircraft on the proper course and glide path to the approach decision height.

Very High Frequency Omnidirectional Range

The Very High Frequency Omnidirectional Range (VOR) is a ground-based radio navigation aid that broadcasts azimuth information to aircraft. VORs broadcast on assigned channels and include the facility identification in Morse code for pilot monitoring and verification. Some VORs are capable of broadcasting weather information and supporting pilot-controller communcations although these capabilities are typically provided by other infrastructure systems. In addition to providing en route and terminal area azimuth guidance, VORs also support nonprecision instrument approach operations.

Currently, VORs are the primary radio navigation aid in the National Airspace System (NAS). They serve as the internationally designated standard short-distance radio navigation aid for air carrier and general aviation Instrument Flight Rules (IFR) operations.

VORs may be installed stand-alone or co-located with either a DME or TACAN system. When co-located the facility is typically referred to as a VOR/DME or VORTAC facility, respectively. This configuration allows pilots to determine their aircraft''s bearing and distance to a single location, i.e., fix.

With the advent of space-based navigation capabilities, a planned reduction in operational VORs will begin in approximately 2010. The reduction will result in a "backbone" minimum operational network (MON) that will support IFR operations at the busiest airports in the NAS while serving as a backup for space-based navigation.

Very High Frequency Omnidirectional Range Avionics

Very High Frequency Omnidirectional Range Avionics (VOR Avionics) receive, process, and display for the pilot the azimuth (bearing) to or from ground-based VOR transmitters.

Increasing numbers of aircraft are being equipped with GPS or WAAS avionics. However, since a reduced network of VOR stations is planned to continue in operation indefinitely as a backup to GPS, VOR avionics are expected to remain in service indefinitely in some aircraft.

Visual Approach Slope Indicator

A Visual Approach Slope Indicator (VASI) system is a light system that is accurately located alongside a runway to provide a visual glide slope to landing aircraft. VASIs radiate a directional pattern of high intensity, red and white focused light beams to form the glide path and are utilized primarily under Visual Flight Rules (VFR) conditions.

People

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Interfaces

Instrument Landing System Category I — (Precision Horizontal and Vertical Guidance Data) ➔ Instrument Landing System Avionics

ILS avionics are a composite of compass locator or ADF receivers, marker beacon, localizer, and glideslope receivers. Within the aircraft, aft the respective receivers may be contained within one enclosure or separate enclosures (black boxes) that provide position determination and precision approach guidance using signals from their respective ground-based transmitters.

Instrument Landing System Category II/III — (Precision Horizontal and Vertical Guidance Data) ➔ Instrument Landing System Avionics

ILS avionics are a composite of compass locator or ADF receivers, marker beacon, localizer, and glideslope receivers. Within the aircraft, aft the respective receivers may be contained within one enclosure or separate enclosures that provide position determination and precision approach guidance using signals from their respective ground-based transmitters. In addition, Category II opeations require two independent localizer and glideslope receivers and indications. Category III operations require three independent localizer and glideslope receivers and indications which must be compared and monitored. One additional marker beacon receiver and ADF receiver must be operational. For Category III/B operations, an inner marker beacon ground facility is required, as well as is a redundant autoland system.

Issues

None

Service Group Air Traffic Services

Service Navigation

Capability Airborne Guidance

Operational Improvement

Domestic RNP Navigation (107114)

Aircraft navigate in the NAS using Required Navigation Performance (RNP) avionics. RNP navigation ensures an aircraft's position remains within a defined airspace volume, allowing decreased enroute separation between aircraft.
31-Jul-2003 to 04-Nov-2020

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

NAS provided ground- and space-based navigation services support routes assigned RNP-2, containment which provides a sufficient level of safety based on the aircraft's own capabilities and does not require radar monitoring or additional separation buffers. For aircraft spacing, RNP-2 navigation performance ensures the aircraft□s position is within a horizontal protection limit of 1 nautical mile radius 99.8% of time with availability of 98.4% using approved supplemental GPS, GPS/WAAS, orLoran-C avionics. DME/DME position solutions integrated into FMS avionics are likely to satisfy RNP en route navigation availability and accuracy requirements. INS provides a sufficient margin of performance for RNP-2 provided that accurate position updates are provided to the INS in a timely fashion.

Benefits

RNP is an enabler to airspace design and to separation. The ability to design and deliver routes with less lateral spacing increases capacity of airspace constrained by terrain or special use airspace since more parallel routes can be designed and made available. RNP improves the access to congested airspace since multiple routes can be designed to separate aircraft that are currently commingled on arrival or departure to a terminal and thus in many cases receive a single airport/runway's restriction.

Systems

Automatic Dependent Surveillance (Safe Flight 21) Ground Station

The Automatic Dependent Surveillance (Safe Flight 21) Ground Station (ADS (SF-21) Ground Station) is a demonstration system used by the Ohio Valley project under the Safe Flight 21 program. It receives Global Positioning System (GPS)-derived aircraft four (4)-dimensional position data, aircraft identification, aircraft velocity, and other selected aircraft data for processing at selected ATC facilities, and transmits Traffic Information System - Broadcast (TIS-B) information on aircraft in areas of radar coverage (and other airspace status information when available) to properly to equipped aircraft, to support SF-21 operational trials. These ground stations will be located in the regions surrounding Memphis, TN and Louisville, KY, and interface with developmental surveillance processing systems.

Automatic Dependent Surveillance - Addressable Avionics

Automatic Dependent Surveillance - Addressable Avionics (ADS-A Avionics) are devices that upon reception of messages specifically addressed to the aircraft, compose and transmit a message specifically addressed to the interrogator, containing the current position of the aircraft as determined by on-board navigation equipment, the aircraft identification, and the short term planned course changes. A specific form of ADS, designed to support oceanic aeronautical operations, based on one-to-one communications between aircraft providing ADS information and a ground facility requiring receipt of ADS reports.

Automatic Dependent Surveillance - Broadcast (Safe Flight-21) Avionics

Automatic Dependent Surveillance-Broadcast (Safe Flight 21) Avionics (ADS-B (SF-21) Avionics) are the surveillance avionics used by the Ohio Valley project under Safe Flight 21. These are demonstration avionics that are used to support ADS-B-related operational trials in the Ohio Valley. ADS-B automatically provides broadcast of the aircraft state vector (horizontal and vertical position, horizontal and vertical velocity and vehicle address). This broadcast is for the intended use as a surveillance, not an avoidance system.

Automatic Dependent Surveillance - Broadcast Avionics (key system)

Automatic Dependent Surveillance-Broadcast Avionics (ADS-B Avionics) transmits and receives Global Positioning System (GPS)-derived aircraft 4-dimensional position data, aircraft identification, aircraft velocity, and other selected aircraft data. Augmented GPS data may be required for certain applications. This is intended to be a surveillance system and not an avoidance system. The broadcast of own position is automatic and is intended to provide surveillance information to other users. The aircraft or vehicle originating the broadcast may not have knowledge of which users are receiving its broadcast. The ADS-B avionics are designed to transmit this 4-dimensional position data of own aircraft or vehicle and to also receive same type of information from others that are similarly equipped to receive and process ADS-B surveillance information.

Automatic Direction Finder

Automatic Direction Finder (ADF) - An aircraft radio navigation system which senses and indicates the direction to a L/MF nondirectional radio beacon (NDB) ground transmitter. Direction is indicated to the pilot as a magnetic bearing or as a relative bearing to the longitudinal axis of the aircraft depending on the type of indicator installed in the aircraft. In certain applications, such as military, ADF operations may be based on airborne and ground transmitters in the VHF/UHF frequency spectrum.

BSGS Broadcast Services Ground Station

The BSGS (Broadcast Services Ground Station) supports Air-Ground broadcast services. This includes the reception of ADS-B from equipped aircraft/vehicles and the transmission of Traffic Information Service-Broadcast (TIS-B) and Flight Information Service-Broadcast (FIS-B) for use by equipped aircraft. Generally, the BSGS will interface via the SDN to provide ADS-B information to ATC automation and receive TIS-B and FIS-B information from TIS-B and FIS-B servers. The BSGS includes antenna(s), one or more dual link (i.e., 1090 MHz Extended Squitter-1090ES and Universal Access Transceiver-UAT) Ground Based Transceiver(s)(GBT), processing functions and communications functions. Several configurations of the BSGS are required to support variations in the geographic service volume and functions to be supported at specific categories of operational sites. BSGSs will be installed at 448 airports and 100 en route locations. Included are those airports equipped with Secondary Surveillance Radar (SSR) and about 140 additional towered airports (currently without SSR). The BSGS will support ADS-B and TIS-B services via both the 1090ES link and by the UAT link. The BSGS will also support FIS-B via the UAT link. BSGSs incorporate a multilink gateway function that provides ADS-B rebroadcasts via the ADS-B alternate link. A BSGS incorporating 2 GBTs are required for airport surface and terminal surveillance coverage at each of 268 smaller airports, a BSGS incorporating 3 GBTs (on average) are required at 120 of the mid-sized airports, and a BSGS incorporating 6 GBTs (on average) are required at the 60 largest airport (those equipped with ASDE-X or ASDE-3 surface surveillance systems).

The following BSGS functions are required to support the various categories of NAS BSGS sites, except as noted below:

(1) 1090ES and UAT receive/transmit (i.e., the GBT funnction); (2) multi-link gateway function; (3) process received ADS-B messages and output (via the SDN) ADS-B reports for use by ATC automation; (4) accept TIS-B and FIS-B information from ground TIS-B/FIS-B servers and manage the generation and broadcast of link specific TIS-B messages via the 1090ES and UAT links and FIS-B messages via the UAT link.

The following BSGS configurations are assumed based on the category of the operational site. Except as noted below all BSGS configuration support the above described functions.

En route (100 sites): (1) One multi-sector antenna with each sector connected to the individual 1090ES and UAT receivers. Supports up to 250 nmi. ADS-B reception. En route locations that are intended to provide only low-altitude gap filler coverage do not require the long-range capability. (2) One omni-directional transmit antenna. Transmitter power sized to support the required TIS-B and FIS-B coverage for that specific site.

Terminal/Airport without ASDE-X (415 airports incl. 27 ASDE-3 equipped airports) with each site having: (1) BSGS with at least 2 GBTs with omni-directional antennas sited for both airport surface and terminal airspace coverage; (2) additional GBTs as needed to provide coverage of the primary airport surface movement area.

Terminal/Airport with ASDE-X (26 ASDE-X plus 7 upgraded ASDE-3 airports with an average of 6 GBTs per BSGS): (1) ASDE-X ground stations upgraded to support GBT functionality; (2) At least two of the GBTs provide ADS-B coverage to the edge of the terminal airspace and the TIS-B coverage; (3) ASDE provides the surveillance data source to support TIS-B for surface traffic.

Baro-Altimeter Avionics (key system)

Baro-Altimeter Avionics (Baro-Alt Avionics NAV) is a barometrically correctable pressure actuated sensing altimeter that utilizes the change of atmospheric pressure to measure altitude above mean sea level (MSL). The altimeter senses pressure changes and displays altitude in feet or meters. Since changes in air pressure directly affect the accuracy of the altitude readout, the altimeter is equipped with an adjustable barometric scale. If capable, Baro-Alt Avionics may provide electrical output to encode a transponder for altitude reporting purposes and/or to use as an input to GPS Avionics or GPS/WAAS Avionics to compensate for deficiency in required satellites to calculate Receiver Autonomous Integrity Monitoring (RAIM) function required for en route through non-precision approaches.

Cockpit Display of Traffic Information Avionics (key system)

The Cockpit Display of Traffic Information Avionics (CDTI Avionics) is a generic name for a display that provides the flight crew with surveillance information about other proximate aircraft, including their position. It enables pilots to electronically "see and avoid" other aircraft.

Cockpit Display of Traffic Information for Safe Flight 21 Avionics

Cockpit Display of Traffic Information for Safe Flight 21 Avionics (CDTI (SF-21) Avionics) is the cockpit display avionics used by the Ohio Valley project under Safe Flight 21. These are demonstration displays that are used to support ADS-B-related operational trials in the Ohio Valley

Distance Measuring Equipment

Distance Measuring Equipment (DME) is a UHF (Ultra High Frequency) ground-based radio navigation aid. DME avionics transmit interrogation pulses, and the ground-based responder sends a reply. The avionics process the reply and determine the slant range between the aircraft and the ground station. Separate funding segments and acquisition projects have been established for two generic classes of DME ground stations: High power (en route) DMEs, and low power (terminal) DMEs. This mechanism addresses the high power DMEs.

DMEs may be provided alone, but are more often collocated with a VOR to form a VOR/DME facility, allowing aircraft to determine both the bearing and slant range to the ground station - and hence a navigational position fix. DMEs are approved as a primary navigation system in the NAS. The DME function is frequently provided by the TACAN system that also provides azimuth guidance to military users. (DME and the distance-measuring portion of TACAN are functionally the same.) When combined with a VOR, these facilities are called VORTACs.

The DME network will be sustained to support en route navigation and to serve as an independent backup navigation source to GPS and GPS/WAAS. The DME network may also need to be expanded to provide a redundant area navigation (RNAV) capability for terminal area operations at major airports.

Distance Measuring Equipment Avionics

Distance Measuring Equipment Avionics (DME Avionics) receives, processes and displays for the pilot the distance data provided by ground-based DMEs.

Domestic Reduced Vertical Separation Minimum Altimeter

Domestic Reduced Vertical Separation Minimum Altimeter (Domestic RVSM Alt) is a source of altitude data or information that was added to support the RVSM capability. It consists of two independent altimeters with enhanced transducers or double aneroid sensors for computing altitude. The altitude source is connected through the static system to provide an automatic means correcting the known static source error of aircraft to improve aircraft altitude measurement capability. Domestic RVSM Alt may also be used to satisfy Oceanic RVSM and the altitude sensor may be included within an air data computer.

Flight Management System

Flight Management System (FMS) is a computer system that uses a large database to allow routes to be preprogrammed and stored. The system is constantly updated with respect to position accuracy by reference to one or more conventional radio navigation aids (i.e., multi-sensor systems). The system may also use information from an inertial reference unit (IRU) or from a stand-alone inertial navigation system (INS). A sophisticated program and its associated database ensure that the most appropriate navaids are automatically selected during the update cycle. FMSs combine the relative position information from two or more point-referenced navigation aids such as VOR or DME to determine the absolute position of the aircraft (latitude, longitude). The resulting Area Navigation (RNAV) capability permits operation on any desired course.

Global Positioning System (key system)

The Global Positioning System (GPS) is a worldwide, all-weather, satellite-based navigation system developed, maintained

& operated by the U.S Department of Defense, and managed by an Interagency executive board. GPS is a (nominal) 24 satellite constellation orbiting at approximately 12,000 miles above the earth in six planes. Each satellite broadcasts a precisely timed L-band signal on the same frequency. User GPS receivers, oboard aircraft, in ground vehicles or hand-held, receive and process the signals from all satellites in view, with a minimum of four satellites necessary to determine the receiver''s three-dimensional position (i.e., latitude, longitude and altitude), velocity (if applicable) and the precise time of day. GPS equipped aircraft can navigate on published jetways or utilize Area Navigation (RNAV) to fly any desired course between two locations.

GPS avionics built to TSO C-129 support en route and terminal area navigation, as well as non-precision instrument approach operations. Approval has been granted for properly certified GPS avionics to be used as a primary means of navigation in oceanic airspace and in certain remote areas. In July 2003 the Wide Area Augmentation System (WAAS)was commissioned to augment the GPS signal to meet primary navigation service requirements for accuracy, coverage, availability, and integrity.

Global Positioning System Avionics (key system)

Global Positioning System (GPS) Avionics process the signals received from four or more GPS satellites and determine the three-dimensional position (i.e., latitude, longitude and altitude) and velocity of an aircraft, as well as the precise time of day. GPS avionics provide an Area Navigation (RNAV) capability that permits operation on any desired course.

GPS avionics built to TSO-C129 do not have augmentation (WAAS, LAAS) and are approved only as a supplemental navigation system in the NAS, meaning that they must be used in conjunction with a primary navigation system. TSO-C129 avionics support en route and terminal area navigation, as well as non-precision instrument approach operations. Approval has been granted for properly certified GPS avionics to be used as a primary means of navigation in oceanic airspace and in certain remote areas. In certain regions of the world (including the NAS), GPS will be augmented (Wide Area and Local Area systems) to satisfy additional requirements for accuracy, coverage, availability, and integrity. Augmented GPS avionics (WAAS, LAAS) are expected to support precision instrument approach operations, and to gain approval as a primary navigation system throughout the NAS. It is anticipated that users will migrate from TSO-C129 avionics to augmented GPS avionics (WAAS, LAAS).

Inertial Navigation System Avionics (key system)

Inertial Navigation System Avionics (INS Avionics) is a self-contained system, comprised of gyroscopes, accelerometers, and a navigation computer, which provides navigation information in response to inertial effects on system components. An INS is typically aligned with accurate position information prior to departure, and thereafter calculates its position as it progresses to the destination. INS accuracy degrades with time, but can be aligned in flight using radio navigation system updates. Many inertial systems employ a sophisticated automatic update scheme using dual- Distance Measuring Equipment (DME), very high frequency (VHF) Omnidirectional Range VOR or other sensor inputs (e.g., Global Positioning System (GPS)).

INS may be approved as a primary navigation system or may be used in combination with other systems. By programming a series of waypoints, the system will navigate along a predetermined track. INS provides an Area Navigation (RNAV) capability that permits operation on any desired course.

Instrument Landing System Avionics

ILS Avionics are a composite of compass locator or ADF receivers, marker beacon, localizer, and glideslope receivers. Within the aircraft the respective receivers may be contained within one enclosure or separate enclosures ("black boxes") that provide position determination and precision approach guidance using signals from their respective ground-based transmitters.Marker beacon transmitters which broadcast on 75 MHz emit tones with respect to their location for detection by the marker beacon receiver which in turn propagates an audio signal and annunciates a lamp indication in the cockpit of the area of passage over each transmitter. Respectively the outer marker (OM) emits a 400 Hz tone, while the middle marker (MM) emits a 1300 Hz tone. The inner marker (IM), consistent with a fan marker emits a 3000 Hz tone. Each tone is discernible both by frequency as well as periodicity.Localizer transmitters operate on one of the 40 ILS channels within the frequency range of 108.10 to 111.95 MHz. Modulated tones produced by he Localizer transmitter that are detected by the VHF navigation receiver and displayed as lateral deviation guidance emitted from the centerline of the runway.Glide slope transmitters operate on one of the 40 ILS channels, typically paired with Localizer frequencies but emit modulated tones on carrier frequencies from 329.3 to 335.0 MHz. Modulated tones are detected by the glide slope receiver and displayed as vertical guidance emitted in the proximity of the touchdown zone of the runway.Compass locators are another component of the IILS having transmitters located at the MM and OM sites. The transmitters have a power of less than 25 watts, a range of at least 15 miles and operate between 190 and 535 kHz. At some locations, higher powered radio beacons, up to 400 watts, are used as OM compass locators. These generally carry Transcribed Weather Broadcast (TWEB) information. Compass locators transmit two letter identification groups. The outer locator transmits the first two letters of the localizer identification group, and the middle locator transmits the last two letters of the localizer identification group.

Loran-C Avionics

Loran-C Avionics receive, process, and display to the pilot the latitude and longitude of the aircraft''''s current position, based on data received from ground-based equipment.

Loran-C is currently approved as a supplemental system in the NAS, meaning that it must be used in conjunction with a primary system. Current Loran-C avionics support en route and terminal area navigation but do not support instrument approach operations. System operation beyond 2008 depends upon analysis by FAA and USCG to ascertain ability to support aviation nonprecision approach operations and maritime harbor entrance & approach operations.

Low Power Distance Measuring Equipment

Distance Measuring Equipment (DME) is an Ultra High Frequency (UHF) ground-based radio-navigation aid. DME avionics reply to interrogations from the ground station, which is capable of processing replies from over 100 aircraft at one time. The DME determines the time between an interrogation and a reply to determine the slant range between them.

Acquisition projects have been established for two generic classes of DME ground stations: high power and low power.

High power DMEs (HPDMEs)are rated at 1kw and are located to support enroute navigation. HPDMEs are typically co-located with VHF OmniRange systems, forming what is termed a VOR/DME facility. Low power DMEs (LPDMEs) are rated at 100w and are located to support terminal area navigation such as ILS approaches.

LPDMEs are installed with many ILS facilities. When specified in the ILS approach procedure, DME may be used in lieu of the outer marker, as a back-course final approach fix, or to establish other fixes on the localizer course. LPDMEs are also installed with some localizer-only (LOC) facilities. Additional LPDMEs are being installed to support ILS approaches as recommended by the Commercial Aviation Safety Team (CAST).

Microwave Landing System

. The MLS provides precision navigation guidance for exact alignment and descent of aircraft on approach to a runway. It provides azimuth, elevation, and distance.2. Both lateral and vertical guidance may be displayed on conventional course deviation indicators or incorporated into multipurpose cockpit displays. Range information can be displayed by conventional DME indicators and also incorporated into multipurpose displays.3. The MLS supplements the ILS as the standard landing system in the United States for civil, military, and international civil aviation. At international airports, ILS service is protected to 2010.4. The system may be divided into five functions: (a) Approach azimuth, (b) Back azimuth, (c) Approach elevation, (d) Range, and (e) Data communications.5. The standard configuration of MLS ground equipment includes: (a) An azimuth station to perform functions (a) and (e) above. In addition to providing azimuth navigation guidance, the station transmits basic data, which consists of information associated directly with the operation of the landing system, as well as advisory data on the performance of the ground equipment. (b) An elevation station to perform function (c). (c) Distance Measuring Equipment (DME) to perform range guidance, both standard DME (DME/N) and precision DME (DME/P).6. MLS Expansion Capabilities: The standard configuration can be expanded by adding one or more of the following functions or characteristics. (a) Back azimuth: Provides lateral guidance for missed approach and departure navigation. (b) Auxiliary data transmissions: Provides additional data, including refined airborne positioning, meteorological information, runway status, and other supplementary information. (c) Expanded Service Volume (ESV) proportional guidance to 60 degrees.7. MLS identification is a four-letter designation starting with the letter M. It is transmitted in International Morse Code at least six times per minute by the approach azimuth (and back azimuth) ground equipment.b. Approach Azimuth Guidance1. The azimuth station transmits MLS angle and data on one of 200 channels within the frequency range of 5031 to 5091 MHz.2. The equipment is normally located about 1,000 feet beyond the stop end of the runway, but there is considerable flexibility in selecting sites. For example, for heliport operations the azimuth transmitter can be collocated with the elevation transmitter.3. The azimuth coverage extends: (a) Laterally, at least 40 degrees on either side of the runway centerline in a standard configuration, (b) In elevation, up to an angle of 15 degrees and to at least 20,000 feet, and(c) In range, to at least 20 NM.

Non-Directional Beacon

Non-Directional Beacons (NDB) are low frequency (LF) or medium frequency (MF) ground-based radio navigation aids that broadcast a continuous wave (CW) signal with a Morse code identification on an assigned frequency signal. NDBs are used by pilots to determine the aircraft''s bearing to the ground station. Some state-owned and locally owned NDBs are also used to provide weather information to pilots.

NDBs can be used for non-precision approaches at low traffic airports, as compass locators (locator outer markers (LOMs)) to aid a pilot in finding the initial approach point of an Instrument Landing System (ILS), and for en route operations in remote areas. NDBs are approved as a primary navigation system in the National Airspace System (NAS).

Tactical Air Navigation Avionics

Tactical Air Navigation Avionics (TACAN Avionics) provide both the bearing and distance to the ground station - and hence a navigational position fix. Many avionics models include an air-to-air mode that enables aircraft to determine distance from each other, which can be particularly useful in rendezvous operations. TACAN is approved as a primary navigation system in the NAS for military and naval operations.

DoD plans to equip military aircraft with GPS. However, with the planned retention of TACAN ground systems as a backup to GPS, TACAN avionics are expected to remain in service indefinitely in some classes of military aircraft.

Tactical Air Navigation System

Tactical Air Navigation (TACAN) is a UHF (ultra high frequency) ground-based radio navigation aid that is the military counterpart of VHF Omnidirectional Range co-located with Distance Measuring Equipment (VOR/DME). TACAN avionics provide both the bearing and slant range to the ground station - and hence a navigation position fix. TACAN is often collocated with civil VOR systems to form a VORTAC to support military aircraft operations. TACAN is approved as a primary navigation system in the National Airspace System (NAS).

Tactical Air Navigation System Replacement

Tactical Air Navigation (TACAN) is a UHF (ultra high frequency) ground-based radio navigation aid that is the military counterpart of VHF Omnidirectional Range/Distance Measuring Equipment (VOR/DME). It is the primary tactical air navigation system for the military services ashore and afloat. TACAN avionics provide both the bearing and slant range to the ground station - and hence a navigational position fix. Many avionics models include an air-to-air mode that enables aircraft to determine distance from each other, which can be particularly useful in rendezvous operations. TACAN is often collocated with civil VOR stations (Denoted as VORTAC facilities) to permit military aircraft to operate in civil airspace. TACAN is approved as a primary navigation system in the National Airspace System (NAS).

Very High Frequency Omnidirectional Range

The Very High Frequency Omnidirectional Range (VOR) is a ground-based radio navigation aid that broadcasts azimuth information to aircraft. VORs broadcast on assigned channels and include the facility identification in Morse code for pilot monitoring and verification. Some VORs are capable of broadcasting weather information and supporting pilot-controller communcations although these capabilities are typically provided by other infrastructure systems. In addition to providing en route and terminal area azimuth guidance, VORs also support nonprecision instrument approach operations.

Currently, VORs are the primary radio navigation aid in the National Airspace System (NAS). They serve as the internationally designated standard short-distance radio navigation aid for air carrier and general aviation Instrument Flight Rules (IFR) operations.

VORs may be installed stand-alone or co-located with either a DME or TACAN system. When co-located the facility is typically referred to as a VOR/DME or VORTAC facility, respectively. This configuration allows pilots to determine their aircraft''s bearing and distance to a single location, i.e., fix.

With the advent of space-based navigation capabilities, a planned reduction in operational VORs will begin in approximately 2010. The reduction will result in a "backbone" minimum operational network (MON) that will support IFR operations at the busiest airports in the NAS while serving as a backup for space-based navigation.

Very High Frequency Omnidirectional Range Avionics

Very High Frequency Omnidirectional Range Avionics (VOR Avionics) receive, process, and display for the pilot the azimuth (bearing) to or from ground-based VOR transmitters.

Increasing numbers of aircraft are being equipped with GPS or WAAS avionics. However, since a reduced network of VOR stations is planned to continue in operation indefinitely as a backup to GPS, VOR avionics are expected to remain in service indefinitely in some aircraft.

WAAS Corrections Broadcast Service (key system)

WAAS Corrections Broadcast Service is comprised of both Space-based and Ground Earth Station components.

Geostationary Earth Orbit (GEO) satellites receive Wide Area Augmentation System (WAAS) correction and integrity information transmitted by Ground Earth Stations (in WAAS terms referred to as Ground Uplink Stations (GUSs)) with information re-broadcast for WAAS avionics reception and use. Current broadcast service leased from INMARSAT".

Wide Area Augmentation System (key system)

The Wide Area Augmentation System (WAAS) consists of a distributed array of Reference and Master Stations designed to provide range correction and integrity information messages that are used by WAAS-capable Global Positioning System (GPS)avionics to accurately determine an aircraft''s 3-dimensional position in space. Accurately surveyed WAAS Reference Stations (WRS) receive and process GPS satellite range data which is forwarded to redundant WAAS Master Stations (WMS) for additional processing before sending the resulting range-correction data to redundant WAAS Ground Uplink Stations (GUS). The GUS transmit the data to Geostationary (GEO) satellites which retransmit them on a GPS civil-use frequency for reception by GPS/WAAS avionics. The WAAS data enables aircraft to determine their position in the airspace with an accuracy that will enable, for WAAS-equipped aircraft, introduction of advanced navigation initiatives such as precision and non-precision approaches to airports throughout the NAS, and reduced longitudinal separation.

The WAAS service volume includes the contiguous United States, Hawaii, portions of Alaska and the Caribbean, and the US border areas with Canada and Mexico. Planned enhancement of WAAS with additional WRS and GEO satellites will improve the coverage and availability of WAAS. Enhancement of the GPS by the Department of Defense (DoD) will provide a second civil frequency for WAAS that will provide additional improvements in navigation performance throughout the NAS. This latter version of the WAAS will be termed the GPS Landing System (GLS).

Wide Area Augmentation System Avionics (key system)

Airborne Navigation Sensors Using the Global Positioning System (GPS) Augmented by the Wide Area Augmentation System (WAAS) combines navigation solutions from time and pseudoranges provided by the DoD Global Positioning System (GPS) satellites within view of the aircraft and pseudoranges provided by the Wide Area Augmentation (WAAS) geostationary satellites in view to compute navigation guidance with respect to courses selected by the flight crew. GPS/WAAS Avionics are approved for use as a primary means of navigation within the CONUS, where available, to satisfy en route, terminal area, and non-precision approaches providing lateral course guidance only. Lateral Navigation (LNAV)/Vertical Navigation (VNAV) non-precision approaches to lower minima are feasible using baro-altimeter avionics inputs. Lateral with Precision Vertical (LPV) guidance using GPS/WAAS Avionics to satisfy near Category I precision approaches with higher minima than ILS is also feasible, when approved under SIAP.

Wide Area Augmentation System Technology Refresh

Elements of WAAS technical refresh consist of two paths. One is improvement to operational capability that enhances performance of WAAS. The other is the known replacement of equipment, including hardware, software, and telecommunications links and networks within the WAAS WMS and GUS.

Technical refresh is subject to "re-baselining" activity that is currently underway and the FAA will make a corporate decision in September 2004.

Support Activities

AF Procedure Development for Domestic RNP Navigation

Airway Facilities procedures document the way airway facility operations are to be executed. The introduction of new systems, or changes to existing systems results in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

AF Training for Domestic RNP Navigation

Airway Facilities (AF) training is provided to AF workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AF Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

Non-FAA Pilot Training for Domestic RNP Navigation

Non-FAA Pilot Training is provided to educate pilots as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional pilot training. Training will generally begin 60 days prior to IOC and be complete within one year following Full Operating Capability.

People

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization.

Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Interfaces

Automatic Dependent Surveillance - Broadcast Avionics ⇐ (Target Data) ⇒ Automatic Dependent Surveillance - Broadcast Avionics

Air-to-air ADS-B target data is exchanged between aircraft for use initially as a situation awareness enhancement. This capability will be expanded to other future applications, such as precision approach and landing and self separation.

Automatic Dependent Surveillance - Broadcast Avionics — (Target Data) ⇒ Cockpit Display of Traffic Information Avionics

The ADS-B avionics provides the flight crew surveillance information about other aircraft in the area and is displayed on the CDTI. This information is initially used for enhanced situation awareness and will be expanded to other future applications such as precision approach and landing and self separation.

Global Positioning System — (Position Data) ⇒ Automatic Dependent Surveillance - Broadcast Avionics

The GPS provides the range data that ADS-B Avionics processes to position data, which is broadcasted to other aircraft, ground vehicles, and ADS ground stations.

Global Positioning System — (Position Data) ⇒ Global Positioning System Avionics

GPS Avionics equipment provides position data by accurately measuring clock and pseudorange data from GPS satellites.

Global Positioning System — (Position Data) ⇒ Wide Area Augmentation System

WAAS capability derives from a network of 25 WAAS Reference Stations (WRS), two WAAS Master Stations (WMS), and two WAAS Ground Uplink Stations (GUS) and their associated GEO satellites. Signals from GPS satellites are monitored by the precisely surveyed WRSs. Each WRS receives and examines the signals from all GPS satellites in view for validity and integrity and, using FAA networks, relays its data to both WMS's. The WMS's process the data to determine the integrity, ionospheric and differential corrections, and residual errors associated with the data from each monitored GPS satellite. The WMS's prepare a correction messages which are relayed to the GUS's for uplink to and re-broadcast by the GEO's on the GPS frequency (designated L1; 1,575.42 MHz).

Global Positioning System — (Position Data) ⇒ Wide Area Augmentation System Avionics

WAAS (or GPS/WAAS) avionics consists of navigation sensors or stand-alone receiver/navigators which use GPS augmented by WAAS that combine navigation solutions from time and pseudoranges provided by the GPS satellites within view of the aircraft and pseudoranges provided by the WAAS GEOs in view to compute navigation guidance with respect to courses selected by the flight crew. GPS/WAAS avionics are approved for use as a primary means of navigation within the CONUS, where available, to satisfy en route, terminal area, and non-precision approaches providing lateral course guidance only. Lateral Navigation (LNAV)/Vertical Navigation (VNAV) approaches to lower minima are feasible using baro-altimeter avionics inputs. Lateral with Precision Vertical (LPV) guidance using GPS/WAAS avionics to support near Category I precision approaches with higher minima than ILS is also feasible, when approved under Standard Instrument Approach Procedures.

WAAS Corrections Broadcast Service — (Position Data) ⇒ Wide Area Augmentation System Avionics

WAAS (or GPS/WAAS) avionics consist of navigation sensors or stand-alone receiver/navigators which use GPS augmented by WAAS that combine navigation solutions from time and pseudoranges provided by the GPS satellites within view of the aircraft and pseudoranges provided by the WAAS geostationary satellites. WAAS Corrections Broadcast Facilities consist of both Space-based and Ground Earth Station components.

Wide Area Augmentation System — (Position Data) ⇒ WAAS Corrections Broadcast Service

Geostationary Earth Orbit (GEO) satellites receive WAAS correction and integrity information transmitted by Ground Earth Stations (in WAAS terms referred to as Ground Uplink Stations (GUS) with information re-broadcast for WAAS avionics reception and use. Current GEO service is leased from INMARSAT".

Issues

Equippage.

Service Group Air Traffic Services

Service Navigation

Capability Airborne Guidance

Operational Improvement

Oceanic Satellite Navigation (RNP-4) (107102)

Improved avionics utilize augmented or non-augmented Global Positioning System (GPS) data so aircraft can achieve Required Navigation Performance -4 (RNP-4) on oceanic routes. RNP ensures increased safety because the aircraft's position is always known to lie within a specific volume of airspace.

31-Jul-2003 to 30-Dec-2022

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Augmented or non-augmented Global Positioning System (GPS) position can achieve Required Navigation Performance 4 (RNP-4), with containment, for a North Atlantic oceanic route, and provide a sufficient level of safety based on the aircraft s own capabilities that does not require radar monitoring or additional separation buffers. For aircraft spacing, oceanic RNP-4 navigation performance requires that the aircraft s position is within a horizontal protection limit of 2 nautical miles radius 99.99% of time with availability of 99.8% using dual GPS systems. Dual inertial navigation systems (INS) provide a sufficient margin of performance for RNP-4 provided that GPS position updates are furnished to the INS at least once per hour. Dual Flight Management Systems (FMS) provide additional functionality by combining navigation position from multiple sensors and enabling other reporting functions of automatic reporting of aircraft present position latitude, longitude, and geometric altitude for station keeping and collision avoidance.

Benefits

RNP-4 provides the necessary navigational performance to establish lower longitudinal and lateral spacing between designated tracks and for aircraft within tracks. This enables increased access to the most favorable winds and altitudes, thus reducing the average fuel-burn and time enroute.

Systems

Automatic Dependent Surveillance - Addressable Avionics (key system)

Automatic Dependent Surveillance - Addressable Avionics (ADS-A Avionics) are devices that upon reception of messages specifically addressed to the aircraft, compose and transmit a message specifically addressed to the interrogator, containing the current position of the aircraft as determined by on-board navigation equipment, the aircraft identification, and the short term planned course changes. A specific form of ADS, designed to support oceanic aeronautical operations, based on one-to-one communications between aircraft providing ADS information and a ground facility requiring receipt of ADS reports.

Baro-Altimeter Avionics

Baro-Altimeter Avionics (Baro-Alt Avionics NAV) is a barometrically correctable pressure actuated sensing altimeter that utilizes the change of atmospheric pressure to measure altitude above mean sea level (MSL). The altimeter senses pressure changes and displays altitude in feet or meters. Since changes in air pressure directly affect the accuracy of the altitude readout, the altimeter is equipped with an adjustable barometric scale. If capable, Baro-Alt Avionics may provide electrical output to encode a transponder for altitude reporting purposes and/or to use as an input to GPS Avionics or GPS/WAAS Avionics to compensate for deficiency in required satellites to calculate Receiver Autonomous Integrity Monitoring (RAIM) function required for en route through non-precision approaches.

Cockpit Display of Traffic Information Avionics (key system)

The Cockpit Display of Traffic Information Avionics (CDTI Avionics) is a generic name for a display that provides the flight crew with surveillance information about other proximate aircraft, including their position. It enables pilots to electronically "see and avoid" other aircraft.

Domestic Reduced Vertical Separation Minimum Altimeter

Domestic Reduced Vertical Separation Minimum Altimeter (Domestic RVSM Alt) is a source of altitude data or information that was added to support the RVSM capability. It consists of two independent altimeters with enhanced transducers or double aneroid sensors for computing altitude. The altitude source is connected through the static system to provide an automatic means correcting the known static source error of aircraft to improve aircraft altitude measurement capability. Domestic RVSM Alt may also be used to satisfy Oceanic RVSM and the altitude sensor may be included within an air data computer.

Flight Management System (key system)

Flight Management System (FMS) is a computer system that uses a large database to allow routes to be preprogrammed and stored. The system is constantly updated with respect to position accuracy by reference to one or more conventional radio navigation aids (i.e., multi-sensor systems). The system may also use information from an inertial reference unit (IRU) or from a stand-alone inertial navigation system (INS). A sophisticated program and its associated database ensure that the most appropriate navaids are automatically selected during the update cycle. FMSs combine the relative position information from two or more point-referenced navigation aids such as VOR or DME to determine the absolute position of the aircraft (latitude, longitude). The resulting Area Navigation (RNAV) capability permits operation on any desired course.

Future Air Navigation System 1/A

The Future Air Navigation System (FANS) is based on the International Civil Aviation Organization□s (ICAO) concept of a phased approach to implementing a modern, satellite-based, global Communication, Navigation, Surveillance/ Air Traffic Management (CNS/ATM) system. The following aircraft avionics are required to support an initial FANS implementation. These functions are referred to as FANS-1; the French developed equivalent for the Airbus A-330/340 is called FANS-A: Automatic Dependent Surveillance (ADS), ATC Data link, Airline Operational Control Data Link, Global Positioning System (GPS.

The FANS operational environment extends beyond the aircraft to include satellite, ground-based receiver/transmit stations, and a controller/pilot datalink system.

FANS 1/A consists of three message applications: AFN (ATS Facility Notification for logon to ATC via data link), ADS (Automatic Dependent Surveillance), CPDLC (Controller Pilot Data Link Communications). FANS 1/A uses the existing ACARS air/ground network to carry data link messages to/from the aircraft.

FANS 1 (Boeing implementation) was first certified in June of 1995 for use in the South Pacific. Oakland, Fiji, Aukland, and Brisbane FIRs were the initial participants for CPDLC using Inmarsat satcom. The latter three FIRs also used ADS for surveillance.

"The OEP identifies the ATOP program for implementation of FANS 1/A in Oakland, Anchorage and NY FIRs beginning in 2003." There are approximately 1000 FANS 1/A equipped aircraft in service as of mid-2002. All long-range model commercial transport aircraft have FANS 1 or FANS A either as standard equipment or as an option. In oceanic and remote areas, where FANS 1/A is currently in use, the Inmarsat geosynchronous satellite constellation provides the air/ground data link. HF data link will undergo trials as a FANS 1/A air/ground data link in late 2002-2003.

Global Positioning System (key system)

The Global Positioning System (GPS) is a worldwide, all-weather, satellite-based navigation system developed, maintained & operated by the U.S Department of Defense, and managed by an Interagency executive board. GPS is a (nominal) 24 satellite constellation orbiting at approximately 12,000 miles above the earth in six planes. Each satellite broadcasts a precisely timed L-band signal on the same frequency. User GPS receivers, oboard aircraft, in ground vehicles or hand-held, receive and process the signals from all satellites in view, with a minimum of four satellites necessary to determine the receiver''s three-dimensional position (i.e., latitude, longitude and altitude), velocity (if applicable) and the precise time of day. GPS equipped aircraft can navigate on published jetways or utilize Area Navigation (RNAV) to fly any desired course between two locations.

GPS avionics built to TSO C-129 support en route and terminal area navigation, as well as non-precision instrument approach operations. Approval has been granted for properly certified GPS avionics to be used as a primary means of navigation in oceanic airspace and in certain remote areas. In July 2003 the Wide Area Augmentation System (WAAS)was commissioned to augment the GPS signal to meet primary navigation service requirements for accuracy, coverage, availability, and integrity.

Global Positioning System Avionics

Global Positioning System (GPS) Avionics process the signals received from four or more GPS satellites and determine the three-dimensional position (i.e., latitude, longitude and altitude) and velocity of an aircraft, as well as the precise time of day. GPS avionics provide an Area Navigation (RNAV) capability that permits operation on any desired course.

GPS avionics built to TSO-C129 do not have augmentation (WAAS, LAAS) and are approved only as a supplemental navigation system in the NAS, meaning that they must be used in conjunction with a primary navigation system. TSO-C129 avionics support en route and terminal area navigation, as well as non-precision instrument approach operations. Approval has been granted for properly certified GPS avionics to be used as a primary means of navigation in oceanic airspace and in certain remote areas. In certain regions of the world (including the NAS), GPS will be augmented (Wide Area and Local Area systems) to satisfy additional requirements for accuracy, coverage, availability, and integrity. Augmented GPS avionics (WAAS, LAAS) are expected to support precision instrument approach operations, and to gain approval as a primary navigation system throughout the NAS. It is anticipated that users will migrate from TSO-C129 avionics to augmented GPS avionics (WAAS, LAAS).

Inertial Navigation System Avionics (key system)

Inertial Navigation System Avionics (INS Avionics) is a self-contained system, comprised of gyroscopes, accelerometers, and a navigation computer, which provides navigation information in response to inertial effects on system components. An INS is typically aligned with accurate position information prior to departure, and thereafter calculates its position as it progresses to the destination. INS accuracy degrades with time, but can be aligned in flight using radio navigation system updates. Many inertial systems employ a sophisticated automatic update scheme using dual- Distance Measuring Equipment (DME), very high frequency (VHF) Omnidirectional Range VOR or other sensor inputs (e.g., Global Positioning System (GPS)).

INS may be approved as a primary navigation system or may be used in combination with other systems. By programming a series of waypoints, the system will navigate along a predetermined track. INS provides an Area Navigation (RNAV) capability that permits operation on any desired course.

WAAS Corrections Broadcast Service (key system)

WAAS Corrections Broadcast Service is comprised of both Space-based and Ground Earth Station components.

Geostationary Earth Orbit (GEO) satellites receive Wide Area Augmentation System (WAAS) correction and integrity information transmitted by Ground Earth Stations (in WAAS terms referred to as Ground Uplink Stations (GUSs)) with information re-broadcast for WAAS avionics reception and use. Current broadcast service leased from INMARSAT".

Wide Area Augmentation System Avionics (key system)

Airborne Navigation Sensors Using the Global Positioning System (GPS) Augmented by the Wide Area Augmentation System (WAAS) combines navigation solutions from time and pseudoranges provided by the DoD Global Positioning System (GPS) satellites within view of the aircraft and pseudoranges provided by the Wide Area Augmentation (WAAS) geostationary satellites in view to compute navigation guidance with respect to courses selected by the flight crew. GPS/WAAS Avionics are approved for use as a primary means of navigation within the CONUS, where available, to satisfy en route, terminal area, and non-precision approaches providing lateral course guidance only. Lateral Navigation (LNAV)/Vertical Navigation (VNAV) non-precision approaches to lower minima are feasible using baro-altimeter avionics inputs. Lateral with Precision Vertical (LPV) guidance using GPS/WAAS Avionics to satisfy near Category I precision approaches with higher minima than ILS is also feasible, when approved under SIAP.

Support Activities

AF Procedure Development for Oceanic SATNAV Navigation (RNP-4)

Airway Facilities procedures document the way airway facility operations are to be executed. The introduction of new systems, or changes to existing systems results in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

AF Training for Oceanic SATNAV Navigation (RNP-4)

Airway Facilities (AF) training is provided to AF workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AF Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

Non-FAA Pilot Training for Oceanic SATNAV Navigation (RNP-4)

Non-FAA Pilot Training is provided to educate pilots as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional pilot training. Training will generally begin 60 days prior to IOC and be complete within one year following Full Operating Capability.

People

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Interfaces

Global Positioning System — (Position Data) → Wide Area Augmentation System Avionics

WAAS (or GPS/WAAS) avionics consists of navigation sensors or stand-alone receiver/navigators which use GPS augmented by WAAS that combine navigation solutions from time and pseudoranges provided by the GPS satellites within view of the aircraft and pseudoranges provided by the WAAS GEOs in view to compute navigation guidance with respect to courses selected by the flight crew. GPS/WAAS avionics are approved for use as a primary means of navigation within the CONUS, where available, to satisfy en route, terminal area, and non-precision approaches providing lateral course guidance only. Lateral Navigation (LNAV)/Vertical Navigation (VNAV) approaches to lower minima are feasible using baro-altimeter avionics inputs. Lateral with Precision Vertical (LPV) guidance using GPS/WAAS avionics to support near Category I precision approaches with higher minima than ILS is also feasible, when approved under Standard Instrument Approach Procedures.

WAAS Corrections Broadcast Service — (Position Data) → Wide Area Augmentation System Avionics

WAAS (or GPS/WAAS) avionics consist of navigation sensors or stand-alone receiver/navigators which use GPS augmented by WAAS that combine navigation solutions from time and pseudoranges provided by the GPS satellites within view of the aircraft and pseudoranges provided by the WAAS geostationary satellites. WAAS Corrections Broadcast Facilities consist of both Space-based and Ground Earth Station components.

Issues

Equippage

Service Group Air Traffic Services

Service Navigation

Capability Airborne Guidance

Operational Improvement

Provide Cat I Precision Approach and Departure Guidance (GLS) Using WAAS (107105)

The Global Positioning System (GPS) and Wide Area Augmentation System (WAAS) broadcast signals that are received and processed by aircraft avionics to provide accurate aircraft position information. The position information is sufficiently accurate throughout the NAS to support runway Category I precision approaches and departure guidance.

01-Jan-2009 to 30-Dec-2022

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

GPS/WAAS avionics process GPS range data and WAAS-calculated correction information to provide navigation with the required integrity, accuracy, availability, and continuity of service to provide precision instrument approaches equivalent to CAT I, i.e., approach minima of three-quarters of-a-mile visibility and 250 foot decision height to runways longer than 4,200 feet in length. In addition to replacing or supplanting ground-based ILS, GPS/WAAS provides precision instrument approach capabilities to airports where conventional ILS cannot provide the necessary service due to terrain, obstacle, or other restrictions. At airports with multiple ILS facilities, the total number of required ILSs may be reduced. At airports requiring new Category I service only the necessary landing and runway lights, visibility monitors, etc. need to be installed to provide the needed service. Provision of GLS will require an improved infrastructure, including at least one additional geostationary satellite and the introduction of dual frequency GPS.

Benefits

Space-based WAAS navigation and landing is a cost effective alternative to ILSs for implementation of Cat I approaches since it does not require the installation and maintenance of individual ILS. At airports with multiple ILS the total number of ILS required may be reduced. At airports requiring new Category I service only the necessary landing and runway lights, visibility monitors, etc. need to be installed to provide the needed service.

WAAS also enables Cat I landing capabilities to runways where ILS cannot be installed due to terrain or obstacles. This same capability can be exercised at airports where Cat I ILS approaches to neighboring runways and/or airports cause operational dependencies between approaching/departing aircraft.

Systems

Approach Lighting System with Sequenced Flashers Model 2

Approach Lighting System with Sequenced Flashers, Model 2 (ALSF-2) is a 2400 foot long array of high intensity incandescent lamps and flashers located on the final approach to a runway and are provided to support Catetory II and III instrument approaches. The ALSF-2 assists pilots transition from low visibility Instrument Meteorological Conditions (IMC) to visual conditions for landing. A row of green lights marks the runway threshold.

These ALSF-2 systems represent the current acquisition of NBP type systems.

Approach Lighting System with Sequenced Flashers Model 2 Technological Refresh

The Approach Lighting System with Sequenced Flashers Model 2 (ALSF-2) is a dual-mode system with 219 lamps that can be re-configured as a 50-light Simplified Short Approach Lighting system with Runway alignment lights (SSALR) to meet reduced approach lighting requirements. The ALSF-2 will support Category II and Category III precision landings and the SSALR will support Category I precision landings. The ALSF-2 tech refresh will utilize technology available in the procurement timeframe.

Approach Lighting System with Sequenced Flashing Lights Model 1

The Approach Lighting System with Sequenced Flashing Lights Model 1 (ALSF-1) is a system of high-intensity lights marking the extended runway centerline for 2,400 to 3,000 feet from the runway threshold. A row of green indicators mark the runway threshold.

ALSF-1 are very old systems and, when funded, will be replaced with current technology MALSR or ALSF-2 systems depending on whether the runway will support Cat I instrument approaches (MALSR) or Cat II/III instrument approaches (ALSF-2).

Automatic Direction Finder

Automatic Direction Finder (ADF) - An aircraft radio navigation system which senses and indicates the direction to a L/MF nondirectional radio beacon (NDB) ground transmitter. Direction is indicated to the pilot as a magnetic bearing or as a relative bearing to the longitudinal axis of the aircraft depending on the type of indicator installed in the aircraft. In certain applications, such as military, ADF operations may be based on airborne and ground transmitters in the VHF/UHF frequency spectrum.

Baro-Altimeter Avionics

Baro-Altimeter Avionics (Baro-Alt Avionics NAV) is a barometrically correctable pressure actuated sensing altimeter that utilizes the change of atmospheric pressure to measure altitude above mean sea level (MSL). The altimeter senses pressure changes and displays altitude in feet or meters. Since changes in air pressure directly affect the accuracy of the altitude readout, the altimeter is equipped with an adjustable barometric scale. If capable, Baro-Alt Avionics may provide electrical output to encode a transponder for altitude reporting purposes and/or to use as an input to GPS Avionics or GPS/WAAS Avionics to compensate for deficiency in required satellites to calculate Receiver Autonomous Integrity Monitoring (RAIM) function required for en route through non-precision approaches.

Cockpit Display of Traffic Information Avionics

The Cockpit Display of Traffic Information Avionics (CDTI Avionics) is a generic name for a display that provides the flight crew with surveillance information about other proximate aircraft, including their position. It enables pilots to electronically "see and avoid" other aircraft.

Distance Measuring Equipment

Distance Measuring Equipment (DME) is a UHF (Ultra High Frequency) ground-based radio navigation aid. DME avionics transmit interrogation pulses, and the ground-based responder sends a reply. The avionics process the reply and determine the slant range between the aircraft and the ground station. Separate funding segments and acquisition projects have been established for two generic classes of DME ground stations: High power (en route) DMEs, and low power (terminal) DMEs. This mechanism addresses the high power DMEs.

DMEs may be provided alone, but are more often collocated with a VOR to form a VOR/DME facility, allowing aircraft to determine both the bearing and slant range to the ground station - and hence a navigational position fix. DMEs are approved as a primary navigation system in the NAS. The DME function is frequently provided by the TACAN system that also provides azimuth guidance to military users. (DME and the distance-measuring portion of TACAN are functionally the same.) When combined with a VOR, these facilities are called VORTACs.

The DME network will be sustained to support en route navigation and to serve as an independent backup navigation source to GPS and GPS/WAAS. The DME network may also need to be expanded to provide a redundant area navigation (RNAV) capability for terminal area operations at major airports.

Distance Measuring Equipment Avionics

Distance Measuring Equipment Avionics (DME Avionics) receives, processes and displays for the pilot the distance data provided by ground-based DMEs.

Domestic Reduced Vertical Separation Minimum Altimeter

Domestic Reduced Vertical Separation Minimum Altimeter (Domestic RVSM Alt) is a source of altitude data or information that was added to support the RVSM capability. It consists of two independent altimeters with enhanced transducers or double aneroid sensors for computing altitude. The altitude source is connected through the static system to provide an automatic means correcting the known static source error of aircraft to improve aircraft altitude measurement capability. Domestic RVSM Alt may also be used to satisfy Oceanic RVSM and the altitude sensor may be included within an air data computer.

Flight Management System

Flight Management System (FMS) is a computer system that uses a large database to allow routes to be preprogrammed and stored. The system is constantly updated with respect to position accuracy by reference to one or more conventional radio navigation aids (i.e., multi-sensor systems). The system may also use information from an inertial reference unit (IRU) or from a stand-alone inertial navigation system (INS). A sophisticated program and its associated database ensure that the most appropriate navaids are automatically selected during the update cycle. FMSs combine the relative position information from two or more point-referenced navigation aids such as VOR or DME to determine the absolute position of the aircraft (latitude, longitude). The resulting Area Navigation (RNAV) capability permits operation on any desired course.

Global Positioning System (key system)

The Global Positioning System (GPS) is a worldwide, all-weather, satellite-based navigation system developed, maintained & operated by the U.S Department of Defense, and managed by an Interagency executive board. GPS is a (nominal) 24 satellite constellation orbiting at approximately 12,000 miles above the earth in six planes. Each satellite broadcasts a precisely timed L-band signal on the same frequency. User GPS receivers, oboard aircraft, in ground vehicles or hand-held, receive and process the signals from all satellites in view, with a minimum of four satellites necessary to determine the receiver''s three-dimensional position (i.e., latitude, longitude and altitude), velocity (if applicable) and the precise time of day. GPS equipped aircraft can navigate on published jetways or utilize Area Navigation (RNAV) to fly any desired course between two locations.

GPS avionics built to TSO C-129 support en route and terminal area navigation, as well as non-precision instrument approach operations. Approval has been granted for properly certified GPS avionics to be used as a primary means of navigation in oceanic airspace and in certain remote areas. In July 2003 the Wide Area Augmentation System (WAAS)was commissioned to augment the GPS signal to meet primary navigation service requirements for accuracy, coverage, availability, and integrity.

Instrument Landing System Avionics

ILS Avionics are a composite of compass locator or ADF receivers, marker beacon, localizer, and glideslope receivers. Within the aircraft the respective receivers may be contained within one enclosure or separate enclosures ("black boxes") that provide position determination and precision approach guidance using signals from their respective ground-based transmitters.Marker beacon transmitters which broadcast on 75 MHz emit tones with respect to their location for detection by the marker beacon receiver which in turn propagates an audio signal and annunciates a lamp indication in the cockpit of the area of passage over each transmitter. Respectively the outer marker (OM) emits a 400 Hz tone, while the middle marker (MM) emits a 1300 Hz tone. The inner marker (IM), consistent with a fan marker emits a 3000 Hz tone. Each tone is discernible both by frequency as well as periodicity.Localizer transmitters operate on one of the 40 ILS channels within the frequency range of 108.10 to 111.95 MHz. Modulated tones produced by he Localizer transmitter that are detected by the VHF navigation receiver and displayed as lateral deviation guidance emitted from the centerline of the runway.Glide slope transmitters operate on one of the 40 ILS channels, typically paired with Localizer frequencies but emit modulated tones on carrier frequencies from 329.3 to 335.0 MHz. Modulated tones are detected by the glide slope receiver and displayed as vertical guidance emitted in the proximity of the touchdown zone of the runway.Compass locators are another component of the IILS having transmitters located at the MM and OM sites. The transmitters have a power of less than 25 watts, a range of at least 15 miles and operate between 190 and 535 kHz. At some locations, higher powered radio beacons, up to 400 watts, are used as OM compass locators. These generally carry Transcribed Weather Broadcast (TWEB) information. Compass locators transmit two letter identification groups. The outer locator transmits the first two letters of the localizer identification group, and the middle locator transmits the last two letters of the localizer identification group.

Instrument Landing System Category I

Category (CAT) I Instrument Landing Systems (ILS) support precision landing operations for visibility conditions equal to or greater than a 200 feet decision height above the runway threshold and a touchdown zone runway visual range of at least

1,800 feet.

All ILS radiate runway approach guidance, i.e., alignment and descent information, to aircraft on final approach to a runway. Equipment-wise an ILS consists of a highly directional localizer located at the far end of the runway, a glide slope located near, and offset from, the approach end of the runway. Marker beacons located along the runway''s approach course provide visual and aural indications in the cockpit that indicate the aircraft''s distance from the runway threshold. Marker beacons can be supplanted or replaced by Distance Measuring Equipment (DME) that is typically co-located with the localizer station. The presence and utilization of a DME to aid in making a precision approach is included in the approach procedure for the runway.

ILS feature integral monitoring of the radiated signals to ensure that the radiated guidance is within specified operating tolerances to ensure the signal-in-space approach guidance is safe. They also possess remote maintenance monitoring (RMM) to support remote access and monitoring of the operating status of each ILS station.

Instrument Landing System Category I Replacement

Provides lateral (azimuth) and vertical (glide slope) guidance to aircraft during precision approach. Supports Category I (CAT I) aircraft landing operations.

CAT I service may eventually be provided by WAAS and/or LAAS at many airports. Until then, service will continue to be provided by ILS technology. This program replaces aging ILS systems through either SLEP or outright replacement.

Instrument Landing System Category II/III

Category (CAT) II Instrument Landing Systems (ILS) support precision landing operations for 100 foot decision heights and a touchdown zone runway visual range (RVR) of at least 1200 feet. CAT III ILS support precision approaches with decision heights of 50 or less feet and touchdown zone RVR less than 700 feet.

All ILS radiate runway approach guidance, i.e., alignment and descent information, to aircraft on final approach to a runway. Equipment-wise an ILS consists of a highly directional localizer located at the far end of the runway, a glide slope located near, and offset from, the approach end of the runway, and marker beacons located along the approach course that provide visual and aural information on how far the aircraft is from the runway threshold. ILS marker beacons can be supplanted or replaced by Distance Measuring Equipment (DME) that is typically co-located with the localizer station. The presence and utilization of a DME to aid in making a precision approach is included in the approach procedure for the runway.

ILS feature integral monitoring of the radiated signals to ensure that the radiated guidance is within specified operating tolerances to ensure the signal-in-space approach guidance is safe. They also possess remote maintenance monitoring (RMM) to support remote access and monitoring of the operating status of each ILS station.

The Local Area Augmentation System (LAAS) may eventually support CAT II/III service. In the interim precision landing services will continue to be provided using ILS technology, which requires that the older population of the current ILS inventory must be either replaced or upgraded (modernized) via a service life extension program.

Instrument Landing System Category II/III Replacement

Provides lateral (azimuth) and vertical (glide slope) guidance to aircraft during precision approach. Supports Category II/III (CAT II/III) aircraft landing operations.

CAT II/III service may eventually be provided by LAAS. Until then, service will continue to be provided by ILS technology. This program replaces aging ILS systems through either SLEP or outright replacement.

Lead-in-light System

A Lead-in-light System (LDIN) consists of one or more series of flashing lights installed at or near ground level that provides positive visual guidance along an approach path, either curving or straight, where special problems exist with hazardous terrain, obstructions, or noise abatement procedures.

Local Area Augmentation System Category I

The Local Area Augmentation System Category I (LAAS CAT I) is a safety-critical precision navigation and landing system that augments Global Positioning System (GPS)range data to provide aircraft position accuracy necessary for CAT I precision approaches; i.e., 200 foot decision height and one-half mile visibility. LAAS will provide service to suitably equipped users for runways equipped with required peripheral systems; e.g., Approach zone Runway Visual Range (RVR) and Approach Lighting System (ALS). The LAAS signal-in-space will provide: (1) local area differential corrections for GPS satellites and WAAS Geostationary Earth Orbit (GEO) satellites; (2) the associated integrity parameters; and (3) the path points that describe the final approach segment.

The LAAS CAT I will utilize multiple GPS reference receivers and their associated antennas, all located within the airport boundary, to receive and decode the GPS and WAAS GEO range measurements and navigation data. The LAAS information is broadcast to aircraft operating in the local terminal area (nominally 20 nautical miles (nmi)) via a LAAS very high frequency (VHF) data broadcast (VDB) transmission.

Local Area Augmentation System Category I Technological Refresh

LAAS CAT I Tech Refresh periodically (5-7 years) replaces Line Replaceable Units (LRUs) that lifecycle engineering analyses determine will become unsupportable. Tech Refresh will not increase the LAAS'' functionality.

Local Area Augmentation System Category II/III Technological Refresh

LAAS CAT II/III Tech Refresh periodically (5-7 years) replaces Line Replaceable Units (LRUs) that lifecycle engineering analyses determine will become unsupportable. Tech Refresh will not increase the LAAS'' functionality.

Localizer

The component of an ILS that provides lateral course guidance to the runway. Localizer will provide non-precision approach capability with appropriate lead-in lights.

Low Power Distance Measuring Equipment

Distance Measuring Equipment (DME) is an Ultra High Frequency (UHF) ground-based radio-navigation aid. DME avionics reply to interrogations from the ground station, which is capable of processing replies from over 100 aircraft at one time. The DME determines the time between an interrogation and a reply to determine the slant range between them.

Acquisition projects have been established for two generic classes of DME ground stations: high power and low power. High power DMEs (HPDMEs)are rated at 1kw and are located to support enroute navigation. HPDMEs are typically co-located with VHF OmniRange systems, forming what is termed a VOR/DME facility. Low power DMEs (LPDMEs) are rated at 100w and are located to support terminal area navigation such as ILS approaches.

LPDMEs are installed with many ILS facilities. When specified in the ILS approach procedure, DME may be used in lieu of the outer marker, as a back-course final approach fix, or to establish other fixes on the localizer course. LPDMEs are also installed with some localizer-only (LOC) facilities. Additional LPDMEs are being installed to support ILS approaches as recommended by the Commercial Aviation Safety Team (CAST).

Medium-Intensity Approach Light System with Runway Alignment Indicator Lights

The Medium-Intensity Approach Light System with Runway Alignment Indicator Lights (MALSR) supports Category I instrument approaches. It is a medium intensity light system that identifies the extended runway centerline from threshold to 2,400 feet before the threshold. The MALSR supports Category I instrument approaches and presents to the pilot the illusion of a ball of light traveling from the outer end of the system to a point approximately 1,400 feet from the end of the runway. A row of green lights marks the threshold of the runway.

MALSF and MALS are subsets of MALSR. A MALSR has 45 lights, 5 flashers, and is 2400 ft in length. A MALSF has 45 lights, 3 flashers, and is 1400 ft in length. MALS has 45 lights, no flashers, and is 1400 ft in length.

Medium-Intensity Approach Light System with Runway Alignment Indicator Lights Next Generation

The Medium-Intensity Approach Light System with Runway Alignment Indicator Lights (RAIL) Next Generation (MALSR NEXGEN) is an array of medium-intensity lights marking the extended runway centerline for approaching aircraft. The RAIL begins 2400 feet from threshold and extends 1000 feet. The MALSR supports Category I instrument approaches and presents the illusion of a ball of light leading towards the runway. The MALS portion of the MALSR begins 1400 feet from threshold and ends 200 feet from threshold. A row of green lights marks the threshold of the runway.

Medium-Intensity Light System with Runway Alignment Indicator Lights Technology Refresh

The Medium-Intensity Light System with Runway Alignment Indicator Lights Technology Refresh (MALSR Tech Refresh) is an array of high intensity Light Emitting Diode (LED) lights marking the extended runway centerline for 2,400 to 3,000 feet from the runway threshold. The MALSR supports Category I instrument approaches and presents to the pilot the illusion of a ball of light traveling from the outer end of the system to a point about 1,400 feet from the end of the runway. An indicator marks a point 1,000 feet from the end of the runway. A row of green lights indicates the threshold of the runway.

Microwave Landing System

. The MLS provides precision navigation guidance for exact alignment and descent of aircraft on approach to a runway. It provides azimuth, elevation, and distance.2. Both lateral and vertical guidance may be displayed on conventional course deviation indicators or incorporated into multipurpose cockpit displays. Range information can be displayed by conventional DME indicators and also incorporated into multipurpose displays.3. The MLS supplements the ILS as the standard landing system in the United States for civil, military, and international civil aviation. At international airports, ILS service is protected to 2010.4. The system may be divided into five functions: (a) Approach azimuth, (b) Back azimuth, (c) Approach elevation, (d) Range, and (e) Data communications.5. The standard configuration of MLS ground equipment includes: (a) An azimuth station to perform functions (a) and (e) above. In addition to providing azimuth navigation guidance, the station transmits basic data, which consists of information associated directly with the operation of the landing system, as well as advisory data on the performance of the ground equipment. (b) An elevation station to perform function (c). (c) Distance Measuring Equipment (DME) to perform range guidance, both standard DME (DME/N) and precision DME (DME/P).6. MLS Expansion Capabilities: The standard configuration can be expanded by adding one or more of the following functions or characteristics. (a) Back azimuth: Provides lateral guidance for missed approach and departure navigation. (b) Auxiliary data transmissions: Provides additional data, including refined airborne positioning, meteorological information, runway status, and other supplementary information. (c) Expanded Service Volume (ESV) proportional guidance to 60 degrees.7. MLS identification is a four-letter designation starting with the letter M. It is transmitted in International Morse Code at least six times per minute by the approach azimuth (and back azimuth) ground equipment.b. Approach Azimuth Guidance1. The azimuth station transmits MLS angle and data on one of 200 channels within the frequency range of 5031 to 5091 MHz.2. The equipment is normally located about 1,000 feet beyond the stop end of the runway, but there is considerable flexibility in selecting sites. For example, for heliport operations the azimuth transmitter can be collocated with the elevation transmitter.3. The azimuth coverage extends: (a) Laterally, at least 40 degrees on either side of the runway centerline in a standard configuration, (b) In elevation, up to an angle of 15 degrees and to at least 20,000 feet, and(c) In range, to at least 20 NM.

Non-Directional Beacon

Non-Directional Beacons (NDB) are low frequency (LF) or medium frequency (MF) ground-based radio navigation aids that broadcast a continuous wave (CW) signal with a Morse code identification on an assigned frequency signal. NDBs are used by pilots to determine the aircraft''s bearing to the ground station. Some state-owned and locally owned NDBs are also used to provide weather information to pilots.

NDBs can be used for non-precision approaches at low traffic airports, as compass locators (locator outer markers (LOMs)) to aid a pilot in finding the initial approach point of an Instrument Landing System (ILS), and for en route operations in remote areas. NDBs are approved as a primary navigation system in the National Airspace System (NAS).

Non-Directional Beacon Replacement

tbd

Omnidirectional Approach Lighting System

The Omnidirectional Approach Lighting System (ODALS) is a system of sequenced flashing lights marking the extended runway centerline for 1,500-feet. Indicators placed at the end of the runway mark each edge of the runway.

Precision Approach Path Indicator

The Precision Approach Path Indicator (PAPI) provides precision visual glide slope guidance to pilots landing in Visual Flight Rules (VFR) conditions. The PAPI consists of four sharp transition projector units located on one side of the runway, spaced laterally at 29.5-foot intervals.

Radar Altimeter Avionics

Radar or Radio Altimeter (RADALT) avionics makes use of the reflection of radio waves from the ground to provide absolute altitude indications to the pilot, as well as altitude inputs to automatic flight control systems and to Traffic Alert and Collision Avoidance Systems (TCAS) for various functions, and is required to conduct Category II and III precision instrument approaches.

Runway Alignment Indicator Lights

Runway Alignment Indicator Lights (RAIL) are a series of sequenced flashing lights that are installed only in combination with other lighting systems.

Runway Centerline Lighting

Runway Centerline Lighting (RWCLL) consists of flush centerline lights spaced at 50-foot intervals beginning 75 feet from the landing threshold and extending to within 75 feet of the opposite end of the runway.

Runway End Identifier Lighting (Next Generation)

Runway End Identifier Lights (REIL) (Next Generation) is the next generation of an airport lighting facility in the terminal area navigation system, consisting of one flashing white high intensity light installed at each approach end corner of a runway and directed towards the approach zone, which enables the pilot to identify the approach end of the runway.

Runway End Identifier Lights

Runway End Identifier Lights (REIL) is an airport lighting system consisting of two flashing, white, high intensity lights located at each approach end corner of a runway. The REILs are directed towards the approach zone to enable pilots to identify the end of the runway.

Runway Lights/Runway Edge Lights

Runway Lights/Runway Edge Lights (RL/REL) are lights having a prescribed angle of emission used to define the lateral limits of a runway. Runway lights are uniformly spaced at intervals of approximately 200-feet, and the intensity may be controlled or preset.

Runway lights and ruuway edge lights are procured, installed, and maintained by the airport. The FAA is not involved with these light systems other than publishing the necssary lighting standards which the airport uses for guidance.

Runway Visual Range

Runway Visual Range (RVR) systems provide a standardized, instantaneous, and accurate method of measuring visibility along runways

Short Approach Lighting System

A Short Approach Lighting System (SALS) is an array of high-intensity lights marking the extended runway centerline for 2,400 to 3,000 feet from the runway threshold. The system presents to the pilot the illusion of a ball of light traveling from the outer end of the system to a point 1,000 feet from the end of the runway. Two additional rows of lights indicate the edges of the runway for the last 1,000 feet with special indicators placed 1,000 feet, 500 feet and at the runway threshold.

Short Approach Lighting System with Sequenced Flashing Lights

Short Approach Lighting System with Sequenced Flashing Lights (SALSF) is an array of high intensity lights marking the extended runway centerline for 1,500 feet. The system presents to the pilot the illusion of a ball of light traveling from the outer end of the system to a point 1,000 feet from the end of the runway. Indicators placed at the end of the runway mark the center and each edge of the runway. An additional indicator marks a point 1,000 feet from the end of the runway.

Simplified Short Approach Light System with Runway Alignment Indicator Lights

The Simplified Short Approach Light System with Runway Alignment Indicator Lights (SSALR) is a SSALS facility with sequence flashers installed from 1,600 to 2,400 feet from the runway threshold. Normal spacing between lights is 200 feet. This system assists pilots in transitioning from precision approach Instrument Flight Rules (IFR) to Visual Flight Rules (VFR) for landing.

Simplified Short Approach Lighting System

The Simplified Short Approach Lighting System (SSALS) is an array of medium-intensity lights marking the extended runway centerline for 1,400 feet. A special indicator marks a point 1,000 feet from the end of the runway. A row of green lights indicates the threshold runway.

Simplified Short Approach Lighting System with Sequenced Flashing Lights

The Simplified Short Approach Lighting System with Sequenced Flashing Lights (SSALF) is a system of medium-intensity lights marking the extended runway centerline for 1,400 feet. The system presents to the pilot the illusion of a ball of light traveling from the outer end of the system (1,400 feet) to a point 1,000 feet from the end of the runway. A special indicator marks a point 1,000 feet from the end of the runway. A row of green lights indicates the threshold runway.

Tactical Air Navigation System

Tactical Air Navigation (TACAN) is a UHF (ultra high frequency) ground-based radio navigation aid that is the military counterpart of VHF Omnidirectional Range co-located with Distance Measuring Equipment (VOR/DME). TACAN avionics provide both the bearing and slant range to the ground station - and hence a navigation position fix. TACAN is often collocated with civil VOR systems to form a VORTAC to support military aircraft operations. TACAN is approved as a primary navigation system in the National Airspace System (NAS).

Touchdown Zone Lighting

A Touchdown Zone Lighting (TDZL) consists of two rows of transverse light bars located symmetrically about the runway centerline normally at 100-foot intervals. The basic system extends 3,000 feet along the runway.

Very High Frequency Omnidirectional Range

The Very High Frequency Omnidirectional Range (VOR) is a ground-based radio navigation aid that broadcasts azimuth information to aircraft. VORs broadcast on assigned channels and include the facility identification in Morse code for pilot monitoring and verification. Some VORs are capable of broadcasting weather information and supporting pilot-controller communcations although these capabilities are typically provided by other infrastructure systems. In addition to providing en route and terminal area azimuth guidance, VORs also support nonprecision instrument approach operations.

Currently, VORs are the primary radio navigation aid in the National Airspace System (NAS). They serve as the internationally designated standard short-distance radio navigation aid for air carrier and general aviation Instrument Flight Rules (IFR) operations.

VORs may be installed stand-alone or co-located with either a DME or TACAN system. When co-located the facility is typically referred to as a VOR/DME or VORTAC facility, respectively. This configuration allows pilots to determine their aircraft''s bearing and distance to a single location, i.e., fix.

With the advent of space-based navigation capabilities, a planned reduction in operational VORs will begin in approximately 2010. The reduction will result in a "backbone" minimum operational network (MON) that will support IFR operations at the busiest airports in the NAS while serving as a backup for space-based navigation.

Very High Frequency Omnidirectional Range Avionics

Very High Frequency Omnidirectional Range Avionics (VOR Avionics) receive, process, and display for the pilot the azimuth (bearing) to or from ground-based VOR transmitters.

Increasing numbers of aircraft are being equipped with GPS or WAAS avionics. However, since a reduced network of VOR stations is planned to continue in operation indefinitely as a backup to GPS, VOR avionics are expected to remain in service indefinitely in some aircraft.

Very High Frequency Omnidirectional Range Replacement

The Very High Frequency Omnidirectional Range (VOR) system is a ground-based radio navigation aid that broadcasts navigation signals, 360 degrees in azimuth, oriented from magnetic north, plus a periodic Morse code identification signal. VOR avionics indicate the azimuth (bearing) to or from the VOR transmitter. Some VOR stations are used for the broadcast of weather information. Air Traffic Control (ATC) or Flight Service Station (FSS) specialists may use the voice features for transmitting instructions or information to pilots.

VOR is the primary radio navigation aid in the National Airspace System (NAS) and is the internationally designated standard short-distance radio navigation aid for air carrier and general aviation Instrument Flight Rules (IFR) operations. Because it forms the basis for defining the airways, its use is an integral part of the ATC procedures. In addition to providing en route and terminal area guidance, VORs also support nonprecision instrument approach operations.

VORs may be provided alone, but are more often collocated with either a DME or TACAN system to form a VOR/DME or VORTAC facility, allowing aircraft to determine both the bearing and distance to the ground station - and hence a navigational position fix.

The number of VOR systems shown herein includes all systems whether stand-alone or co-located with an NDB, DME or TACAN system.

A reduction in the VOR (only) population is expected to begin in 2010. The proposed reduction will transition from todays VOR services to a minimum operational network (MON) that will support IFR operations at the busiest airports and serve as an independent backup navigation source to GPS and GPS/WAAS. Those VORs that remain in service will need to be replaced or SLEPd, as portrayed in the quantities depicted in this mechanism.

Visual Approach Slope Indicator

A Visual Approach Slope Indicator (VASI) system is a light system that is accurately located alongside a runway to provide a visual glide slope to landing aircraft. VASIs radiate a directional pattern of high intensity, red and white focused light beams to form the glide path and are utilized primarily under Visual Flight Rules (VFR) conditions.

WAAS Corrections Broadcast Service (key system)

WAAS Corrections Broadcast Service is comprised of both Space-based and Ground Earth Station components.

Geostationary Earth Orbit (GEO) satellites receive Wide Area Augmentation System (WAAS) correction and integrity information transmitted by Ground Earth Stations (in WAAS terms referred to as Ground Uplink Stations (GUSs)) with information re-broadcast for WAAS avionics reception and use. Current broadcast service leased from INMARSAT".

Wide Area Augmentation System

The Wide Area Augmentation System (WAAS) consists of a distributed array of Reference and Master Stations designed to provide range correction and integrity information messages that are used by WAAS-capable Global Positioning System (GPS)avionics to accurately determine an aircraft''s 3-dimensional position in space. Accurately surveyed WAAS Reference Stations (WRS) receive and process GPS satellite range data which is forwarded to redundant WAAS Master Stations (WMS) for additional processing before sending the resulting range-correction data to redundant WAAS Ground Uplink Stations (GUS). The GUS transmit the data to Geostationary (GEO) satellites which retransmit them on a GPS civil-use frequency for reception by GPS/WAAS avionics. The WAAS data enables aircraft to determine their position in the airspace with an accuracy that will enable, for WAAS-equipped aircraft, introduction of advanced navigation initiatives such as precision and non-precision approaches to airports throughout the NAS, and reduced longitudinal separation.

The WAAS service volume includes the contiguous United States, Hawaii, portions of Alaska and the Caribbean, and the US border areas with Canada and Mexico. Planned enhancement of WAAS with additional WRS and GEO satellites will improve the coverage and availability of WAAS. Enhancement of the GPS by the Department of Defense (DoD) will provide a second civil frequency for WAAS that will provide additional improvements in navigation performance throughout the NAS. This latter version of the WAAS will be termed the GPS Landing System (GLS).

Wide Area Augmentation System Avionics (key system)

Airborne Navigation Sensors Using the Global Positioning System (GPS) Augmented by the Wide Area Augmentation System (WAAS) combines navigation solutions from time and pseudoranges provided by the DoD Global Positioning System (GPS) satellites within view of the aircraft and pseudoranges provided by the Wide Area Augmentation (WAAS) geostationary satellites in view to compute navigation guidance with respect to courses selected by the flight crew. GPS/WAAS Avionics are approved for use as a primary means of navigation within the CONUS, where available, to satisfy en route, terminal area, and non-precision approaches providing lateral course guidance only. Lateral Navigation (LNAV)/Vertical Navigation (VNAV) non-precision approaches to lower minima are feasible using baro-altimeter avionics inputs. Lateral with Precision Vertical (LPV) guidance using GPS/WAAS Avionics to satisfy near Category I precision approaches with higher minima than ILS is also feasible, when approved under SIAP.

Wide Area Augmentation System Technology Refresh (key system)

Elements of WAAS technical refresh consist of two paths. One is improvement to operational capability that enhances performance of WAAS. The other is the known replacement of equipment, including hardware, software, and telecommunications links and networks within the WAAS WMS and GUS.

Technical refresh is subject to "re-baselining" activity that is currently underway and the FAA will make a corporate decision in September 2004.

Support Activities

AF Procedure Development for Cat I Precision Approach and Departure Guidance Using WAAS

Airway Facilities procedures document the way airway facility operations are to be executed. The introduction of new systems, or changes to existing systems results in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

AF Training for Cat I Precision Approach and Departure Guidance Using WAAS

Airway Facilities (AF) training is provided to AF workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AF Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

Non-FAA Pilot Training for Cat I Precision Approach and Departure Guidance Using WAAS

Non-FAA Pilot Training is provided to educate pilots as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional pilot training. Training will generally begin 60 days prior to IOC and be complete within one year following Full Operating Capability.

People

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Interfaces

Global Positioning System — (Position Data) → Wide Area Augmentation System Avionics

WAAS (or GPS/WAAS) avionics consists of navigation sensors or stand-alone receiver/navigators which use GPS augmented by WAAS that combine navigation solutions from time and pseudoranges provided by the GPS satellites within view of the aircraft and pseudoranges provided by the WAAS GEOs in view to compute navigation guidance with respect to courses selected by the flight crew. GPS/WAAS avionics are approved for use as a primary means of navigation within the CONUS, where available, to satisfy en route, terminal area, and non-precision approaches providing lateral course guidance only. Lateral Navigation (LNAV)/Vertical Navigation (VNAV) approaches to lower minima are feasible using baro-altimeter avionics inputs. Lateral with Precision Vertical (LPV) guidance using GPS/WAAS avionics to support near Category I precision approaches with higher minima than ILS is also feasible, when approved under Standard Instrument Approach Procedures.

WAAS Corrections Broadcast Service — (Position Data) → Wide Area Augmentation System Avionics

WAAS (or GPS/WAAS) avionics consist of navigation sensors or stand-alone receiver/navigators which use GPS augmented by WAAS that combine navigation solutions from time and pseudoranges provided by the GPS satellites within view of the aircraft and pseudoranges provided by the WAAS geostationary satellites. WAAS Corrections Broadcast Facilities consist of both Space-based and Ground Earth Station components.

Issues

Availability of backup ground-based Cat I landing systems for GPS/WAAS.

Service Group Air Traffic Services

Service Navigation

Capability Airborne Guidance

Operational Improvement

Provide Catagory I-II-III Precision Approaches Using LAAS (107107)

Local Area Augmentation Systems (LAAS) will support precision approaches to Category I, Category II and Category III minimums for properly equipped runways and aircraft. LAAS will support approach minimums at airports where ILS cannot meet performance requirements due to terrain, obstacle or other restrictions.

30-Jun-2007 to 30-Dec-2037

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Local Area Augmentation System (LAAS) will complement the Wide Area Augmentation System (WAAS) by providing Category I and Category II/III precision approach and landing services. LAAS Category I systems will be installed at airports which require a standalone navigation and landing capability and at airports where WAAS coverage is unable to meet existing Category I navigation and landing requirements due to insufficient satellite coverage or availability (i.e. some locations in Alaska). LAAS Category II/III systems will be installed at higher usage airports, which require the more precise navigation and landing service. LAAS will provide precise correction data to airborne and surface receivers that will provide a navigation accuracy of less than 4 meters to distances of 20 miles or more from each runway end. The LAAS system is designed to collect data from GPS satellites in view, make the necessary corrections and transmit them via VHF broadcast to aircraft. The LAAS will satisfy the need of providing all-weather approach and landing as well as surface navigation capabilities with significant improvements in service flexibility, safety, and user operating cost. The LAAS will accomplish this through reduced siting constraints, and reduced ground and avionics installation cost. A single LAAS system will be capable of providing precision approach capabilities to multiple runways. LAAS can also provide precision approach service where ILS cannot due to airport terrain difficulties, space limitations, or interfering obstructions such as hangers, towers, etc.

Benefits

Increased airport access for precision approaches, reduced ground equipment for multiple runway airports, and advanced approach and departure procedures.

Systems

Approach Lighting System with Sequenced Flashers Model 2

Approach Lighting System with Sequenced Flashers, Model 2 (ALSF-2) is a 2400 foot long array of high intensity incandescent lamps and flashers located on the final approach to a runway and are provided to support Catetory II and III instrument approaches. The ALSF-2 assists pilots transition from low visibility Instrument Meteorological Conditions (IMC) to visual conditions for landing. A row of green lights marks the runway threshold.

These ALSF-2 systems represent the current acquisition of NBP type systems.

Approach Lighting System with Sequenced Flashers Model 2 Technological Refresh

The Approach Lighting System with Sequenced Flashers Model 2 (ALSF-2) is a dual-mode system with 219 lamps that can be re-configured as a 50-light Simplified Short Approach Lighting system with Runway alignment lights (SSALR) to meet reduced approach lighting requirements. The ALSF-2 will support Category II and Category III precision landings and the SSALR will support Category I precision landings. The ALSF-2 tech refresh will utilize technology available in the procurement timeframe.

Approach Lighting System with Sequenced Flashing Lights Model 1

The Approach Lighting System with Sequenced Flashing Lights Model 1 (ALSF-1) is a system of high-intensity lights marking the extended runway centerline for 2,400 to 3,000 feet from the runway threshold. A row of green indicators mark the runway threshold.

ALSF-1 are very old systems and, when funded, will be replaced with current technology MALSR or ALSF-2 systems depending on whether the runway will support Cat I instrument approaches (MALSR) or Cat II/III instrument approaches (ALSF-2).

Automatic Direction Finder

Automatic Direction Finder (ADF) - An aircraft radio navigation system which senses and indicates the direction to a L/MF nondirectional radio beacon (NDB) ground transmitter. Direction is indicated to the pilot as a magnetic bearing or as a relative bearing to the longitudinal axis of the aircraft depending on the type of indicator installed in the aircraft. In certain applications, such as military, ADF operations may be based on airborne and ground transmitters in the VHF/UHF frequency spectrum.

Baro-Altimeter Avionics

Baro-Altimeter Avionics (Baro-Alt Avionics NAV) is a barometrically correctable pressure actuated sensing altimeter that utilizes the change of atmospheric pressure to measure altitude above mean sea level (MSL). The altimeter senses pressure changes and displays altitude in feet or meters. Since changes in air pressure directly affect the accuracy of the altitude readout, the altimeter is equipped with an adjustable barometric scale. If capable, Baro-Alt Avionics may provide electrical output to encode a transponder for altitude reporting purposes and/or to use as an input to GPS Avionics or GPS/WAAS Avionics to compensate for deficiency in required satellites to calculate Receiver Autonomous Integrity Monitoring (RAIM) function required for en route through non-precision approaches.

Cockpit Display of Traffic Information Avionics

The Cockpit Display of Traffic Information Avionics (CDTI Avionics) is a generic name for a display that provides the flight crew with surveillance information about other proximate aircraft, including their position. It enables pilots to electronically "see and avoid" other aircraft.

Distance Measuring Equipment

Distance Measuring Equipment (DME) is a UHF (Ultra High Frequency) ground-based radio navigation aid. DME avionics transmit interrogation pulses, and the ground-based responder sends a reply. The avionics process the reply and determine the slant range between the aircraft and the ground station. Separate funding segments and acquisition projects have been established for two generic classes of DME ground stations: High power (en route) DMEs, and low power (terminal) DMEs. This mechanism addresses the high power DMEs.

DMEs may be provided alone, but are more often collocated with a VOR to form a VOR/DME facility, allowing aircraft to determine both the bearing and slant range to the ground station - and hence a navigational position fix. DMEs are approved as a primary navigation system in the NAS. The DME function is frequently provided by the TACAN system that also provides azimuth guidance to military users. (DME and the distance-measuring portion of TACAN are functionally the same.) When combined with a VOR, these facilities are called VORTACs.

The DME network will be sustained to support en route navigation and to serve as an independent backup navigation source to GPS and GPS/WAAS. The DME network may also need to be expanded to provide a redundant area navigation (RNAV) capability for terminal area operations at major airports.

Distance Measuring Equipment Avionics

Distance Measuring Equipment Avionics (DME Avionics) receives, processes and displays for the pilot the distance data provided by ground-based DMEs.

Domestic Reduced Vertical Separation Minimum Altimeter

Domestic Reduced Vertical Separation Minimum Altimeter (Domestic RVSM Alt) is a source of altitude data or information that was added to support the RVSM capability. It consists of two independent altimeters with enhanced transducers or double aneroid sensors for computing altitude. The altitude source is connected through the static system to provide an automatic means correcting the known static source error of aircraft to improve aircraft altitude measurement capability. Domestic RVSM Alt may also be used to satisfy Oceanic RVSM and the altitude sensor may be included within an air data computer.

Enhanced Vision System

The Enhanced Vision System uses an infrared camera to provide the pilot with enhanced situational awareness during poor weather conditions and during nighttime approaches and landings.

Flight Management System

Flight Management System (FMS) is a computer system that uses a large database to allow routes to be preprogrammed and stored. The system is constantly updated with respect to position accuracy by reference to one or more conventional radio navigation aids (i.e., multi-sensor systems). The system may also use information from an inertial reference unit

(IRU) or from a stand-alone inertial navigation system (INS). A sophisticated program and its associated database ensure that the most appropriate navaids are automatically selected during the update cycle. FMSs combine the relative position information from two or more point-referenced navigation aids such as VOR or DME to determine the absolute position of the aircraft (latitude, longitude). The resulting Area Navigation (RNAV) capability permits operation on any desired course.

Global Positioning System (key system)

The Global Positioning System (GPS) is a worldwide, all-weather, satellite-based navigation system developed, maintained & operated by the U.S Department of Defense, and managed by an Interagency executive board. GPS is a (nominal) 24 satellite constellation orbiting at approximately 12,000 miles above the earth in six planes. Each satellite broadcasts a precisely timed L-band signal on the same frequency. User GPS receivers, oboard aircraft, in ground vehicles or hand-held, receive and process the signals from all satellites in view, with a minimum of four satellites necessary to determine the receiver''s three-dimensional position (i.e., latitude, longitude and altitude), velocity (if applicable) and the precise time of day. GPS equipped aircraft can navigate on published jetways or utilize Area Navigation (RNAV) to fly any desired course between two locations.

GPS avionics built to TSO C-129 support en route and terminal area navigation, as well as non-precision instrument approach operations. Approval has been granted for properly certified GPS avionics to be used as a primary means of navigation in oceanic airspace and in certain remote areas. In July 2003 the Wide Area Augmentation System (WAAS)was commissioned to augment the GPS signal to meet primary navigation service requirements for accuracy, coverage, availability, and integrity.

Global Positioning System Avionics

Global Positioning System (GPS) Avionics process the signals received from four or more GPS satellites and determine the three-dimensional position (i.e., latitude, longitude and altitude) and velocity of an aircraft, as well as the precise time of day. GPS avionics provide an Area Navigation (RNAV) capability that permits operation on any desired course.

GPS avionics built to TSO-C129 do not have augmentation (WAAS, LAAS) and are approved only as a supplemental navigation system in the NAS, meaning that they must be used in conjunction with a primary navigation system. TSO-C129 avionics support en route and terminal area navigation, as well as non-precision instrument approach operations. Approval has been granted for properly certified GPS avionics to be used as a primary means of navigation in oceanic airspace and in certain remote areas. In certain regions of the world (including the NAS), GPS will be augmented (Wide Area and Local Area systems) to satisfy additional requirements for accuracy, coverage, availability, and integrity. Augmented GPS avionics (WAAS, LAAS) are expected to support precision instrument approach operations, and to gain approval as a primary navigation system throughout the NAS. It is anticipated that users will migrate from TSO-C129 avionics to augmented GPS avionics (WAAS, LAAS).

Instrument Landing System Category I Replacement

Provides lateral (azimuth) and vertical (glide slope) guidance to aircraft during precision approach. Supports Category I (CAT I) aircraft landing operations.

CAT I service may eventually be provided by WAAS and/or LAAS at many airports. Until then, service will continue to be provided by ILS technology. This program replaces aging ILS systems through either SLEP or outright replacement.

Instrument Landing System Category II/III Replacement

Provides lateral (azimuth) and vertical (glide slope) guidance to aircraft during precision approach. Supports Category II/III (CAT II/III) aircraft landing operations.

CAT II/III service may eventually be provided by LAAS. Until then, service will continue to be provided by ILS technology. This program replaces aging ILS systems through either SLEP or outright replacement.

Lead-in-light System

A Lead-in-light System (LDIN) consists of one or more series of flashing lights installed at or near ground level that provides positive visual guidance along an approach path, either curving or straight, where special problems exist with hazardous terrain, obstructions, or noise abatement procedures.

Local Area Augmentation System Avionics

Local Area Augmentation System Avionics uses position corrections provided by GPS and WAAS that are received through a VHF communications data link using existing VOR frequencies to provide a space-based precision approach navigation capability to the NAS that meets the requirements for all weather approach and landing capability. Additionally, LAAS Avionics provides a signal consisting of position, velocity, and time (PVT) that may be used in applications to support surface vehicle location.

Local Area Augmentation System Category I (key system)

The Local Area Augmentation System Category I (LAAS CAT I) is a safety-critical precision navigation and landing system that augments Global Positioning System (GPS)range data to provide aircraft position accuracy necessary for CAT I precision approaches; i.e., 200 foot decision height and one-half mile visibility. LAAS will provide service to suitably equipped users for runways equipped with required peripheral systems; e.g., Approach zone Runway Visual Range (RVR) and Approach Lighting System (ALS). The LAAS signal-in-space will provide: (1) local area differential corrections for GPS satellites and WAAS Geostationary Earth Orbit (GEO) satellites; (2) the associated integrity parameters; and (3) the path points that describe the final approach segment.

The LAAS CAT I will utilize multiple GPS reference receivers and their associated antennas, all located within the airport boundary, to receive and decode the GPS and WAAS GEO range measurements and navigation data. The LAAS information is broadcast to aircraft operating in the local terminal area (nominally 20 nautical miles (nmi)) via a LAAS very high frequency (VHF) data broadcast (VDB) transmission.

Local Area Augmentation System Category I Technological Refresh

LAAS CAT I Tech Refresh periodically (5-7 years) replaces Line Replaceable Units (LRUs) that lifecycle engineering analyses determine will become unsupportable. Tech Refresh will not increase the LAAS'' functionality.

Local Area Augmentation System Category II/III (key system)

The CAT II/III Local Area Augmentation System (LAAS) will provide guidance that meets the accuracy, integrity and availabililty requirements for CAT II and III precision approaches. The Wide Area Augmentation System (WAAS) and LAAS will provide a seamless satellite-based navigation capability for all phases of flight.

CAT II/III LAAS is an ongoing R&D effort which, if successful, is envisioned to lead to a follow-on development and procurement program. CAT II/III LAAS installations might ultimately complement or replace the CAT II/III Instrument Landing Systems (ILS) that are currently in the NAS.

LAAS consists of a precisely surveyed ground station with multiple Global Positioning System (GPS) receivers, a very high frequency (VHF) radio data broadcast (VDB), and possibly one or more pseudolites to increase availability. The LAAS ground station will receive, process, and communicate differential correction information, together with an integrity message, to aircraft avionics within a nominal radius of 20 to 30 nautical miles from the airport.

Pseudolite ground-based transmitters that transmit GPS-like signals may be required to ensure the LAAS performs to CAT II/III requirements. Peudolites can be used as a data link (to transmit differential corrections and integrity status to user platforms) and as supplementary ranging sources for LAAS. Pseudolites used as ranging sources can improve system accuracy by improving the local constellation geometry and system availability.

Local Area Augmentation System Category II/III Technological Refresh

LAAS CAT II/III Tech Refresh periodically (5-7 years) replaces Line Replaceable Units (LRUs) that lifecycle engineering analyses determine will become unsupportable. Tech Refresh will not increase the LAAS'' functionality.

Medium-Intensity Approach Light System with Runway Alignment Indicator Lights

The Medium-Intensity Approach Light System with Runway Alignment Indicator Lights (MALSR) supports Category I instrument approaches. It is a medium intensity light system that identifies the extended runway centerline from threshold to 2,400 feet before the threshold. The MALSR supports Category I instrument approaches and presents to the pilot the illusion of a ball of light traveling from the outer end of the system to a point approximately 1,400 feet from the end of the runway. A row of green lights marks the threshold of the runway.

MALSF and MALS are subsets of MALSR. A MALSR has 45 lights, 5 flashers, and is 2400 ft in length. A MALSF has 45 lights, 3 flashers, and is 1400 ft in length. MALS has 45 lights, no flashers, and is 1400 ft in length.

Medium-Intensity Approach Light System with Runway Alignment Indicator Lights Next Generation

The Medium-Intensity Approach Light System with Runway Alignment Indicator Lights (RAIL) Next Generation (MALSR NEXGEN) is an array of medium-intensity lights marking the extended runway centerline for approaching aircraft. The RAIL begins 2400 feet from threshold and extends 1000 feet. The MALSR supports Category I instrument approaches and presents the illusion of a ball of light leading towards the runway. The MALS portion of the MALSR begins 1400 feet from threshold and ends 200 feet from threshold. A row of green lights marks the threshold of the runway.

Medium-Intensity Light System with Runway Alignment Indicator Lights Technology Refresh

The Medium-Intensity Light System with Runway Alignment Indicator Lights Technology Refresh (MALSR Tech Refresh) is an array of high intensity Light Emitting Diode (LED) lights marking the extended runway centerline for 2,400 to 3,000 feet from the runway threshold. The MALSR supports Category I instrument approaches and presents to the pilot the illusion of a ball of light traveling from the outer end of the system to a point about 1,400 feet from the end of the runway. An indicator marks a point 1,000 feet from the end of the runway. A row of green lights indicates the threshold of the runway.

Microwave Landing System

. The MLS provides precision navigation guidance for exact alignment and descent of aircraft on approach to a runway. It provides azimuth, elevation, and distance.2. Both lateral and vertical guidance may be displayed on conventional course deviation indicators or incorporated into multipurpose cockpit displays. Range information can be displayed by conventional DME indicators and also incorporated into multipurpose displays.3. The MLS supplements the ILS as the standard landing system in the United States for civil, military, and international civil aviation. At international airports, ILS service is protected to 2010.4. The system may be divided into five functions: (a) Approach azimuth, (b) Back azimuth, (c) Approach elevation, (d) Range, and (e) Data communications.5. The standard configuration of MLS ground equipment includes: (a) An azimuth station to perform functions (a) and (e) above. In addition to providing azimuth navigation guidance, the station transmits basic data, which consists of information associated directly with the operation of the landing system, as well as advisory data on the performance of the ground equipment. (b) An elevation station to perform function (c). (c) Distance Measuring Equipment (DME) to perform range guidance, both standard DME (DME/N) and precision DME (DME/P).6. MLS Expansion Capabilities: The standard configuration can be expanded by adding one or more of the following functions or characteristics. (a) Back azimuth: Provides lateral guidance for missed approach and departure navigation. (b) Auxiliary data transmissions: Provides additional data, including refined airborne positioning, meteorological information, runway status, and other supplementary information. (c) Expanded Service Volume (ESV) proportional guidance to 60 degrees.7. MLS identification is a four-letter designation starting with the letter M. It is transmitted in International Morse Code at least six times per minute by the approach azimuth (and back azimuth) ground equipment.b. Approach Azimuth Guidance1. The azimuth station transmits MLS angle and data on one of 200 channels within the frequency range of 5031 to 5091 MHz.2. The equipment is normally located about 1,000 feet beyond the stop end of the runway, but there is considerable flexibility in selecting sites. For example, for heliport operations the azimuth transmitter can be collocated with the elevation transmitter.3. The azimuth coverage extends: (a) Laterally, at least 40 degrees on either side of the runway centerline in a standard configuration, (b) In elevation, up to an angle of 15 degrees and to at least 20,000 feet, and(c) In range, to at least 20 NM.

Non-Directional Beacon Replacement

tbd

Omnidirectional Approach Lighting System

The Omnidirectional Approach Lighting System (ODALS) is a system of sequenced flashing lights marking the extended runway centerline for 1,500-feet. Indicators placed at the end of the runway mark each edge of the runway.

Precision Approach Path Indicator

The Precision Approach Path Indicator (PAPI) provides precision visual glide slope guidance to pilots landing in Visual Flight Rules (VFR) conditions. The PAPI consists of four sharp transition projector units located on one side of the runway, spaced laterally at 29.5-foot intervals.

Radar Altimeter Avionics

Radar or Radio Altimeter (RADALT) avionics makes use of the reflection of radio waves from the ground to provide absolute altitude indications to the pilot, as well as altitude inputs to automatic flight control systems and to Traffic Alert and Collision Avoidance Systems (TCAS) for various functions, and is required to conduct Category II and III precision instrument approaches.

Runway Alignment Indicator Lights

Runway Alignment Indicator Lights (RAIL) are a series of sequenced flashing lights that are installed only in combination with other lighting systems.

Runway Centerline Lighting

Runway Centerline Lighting (RWCLL) consists of flush centerline lights spaced at 50-foot intervals beginning 75 feet from the landing threshold and extending to within 75 feet of the opposite end of the runway.

Runway End Identifier Lighting (Next Generation)

Runway End Identifier Lights (REIL) (Next Generation) is the next generation of an airport lighting facility in the terminal area navigation system, consisting of one flashing white high intensity light installed at each approach end corner of a runway and directed towards the approach zone, which enables the pilot to identify the approach end of the runway.

Runway End Identifier Lights

Runway End Identifier Lights (REIL) is an airport lighting system consisting of two flashing, white, high intensity lights located at each approach end corner of a runway. The REILs are directed towards the approach zone to enable pilots to identify the end of the runway.

Runway Lights/Runway Edge Lights

Runway Lights/Runway Edge Lights (RL/REL) are lights having a prescribed angle of emission used to define the lateral limits of a runway. Runway lights are uniformly spaced at intervals of approximately 200-feet, and the intensity may be controlled or preset.

Runway lights and ruuway edge lights are procured, installed, and maintained by the airport. The FAA is not involved with these light systems other than publishing the necssary lighting standards which the airport uses for guidance.

Runway Visual Range

Runway Visual Range (RVR) systems provide a standardized, instantaneous, and accurate method of measuring visibility along runways

Short Approach Lighting System

A Short Approach Lighting System (SALS) is an array of high-intensity lights marking the extended runway centerline for 2,400 to 3,000 feet from the runway threshold. The system presents to the pilot the illusion of a ball of light traveling from the outer end of the system to a point 1,000 feet from the end of the runway. Two additional rows of lights indicate the edges of the runway for the last 1,000 feet with special indicators placed 1,000 feet, 500 feet and at the runway threshold.

Short Approach Lighting System with Sequenced Flashing Lights

Short Approach Lighting System with Sequenced Flashing Lights (SALSF) is an array of high intensity lights marking the extended runway centerline for 1,500 feet. The system presents to the pilot the illusion of a ball of light traveling from the outer end of the system to a point 1,000 feet from the end of the runway. Indicators placed at the end of the runway mark the center and each edge of the runway. An additional indicator marks a point 1,000 feet from the end of the runway.

Simplified Short Approach Light System with Runway Alignment Indicator Lights

The Simplified Short Approach Light System with Runway Alignment Indicator Lights (SSALR) is a SSALS facility with sequence flashers installed from 1,600 to 2,400 feet from the runway threshold. Normal spacing between lights is 200 feet. This system assists pilots in transitioning from precision approach Instrument Flight Rules (IFR) to Visual Flight Rules (VFR) for landing.

Simplified Short Approach Lighting System

The Simplified Short Approach Lighting System (SSALS) is an array of medium-intensity lights marking the extended runway centerline for 1,400 feet. A special indicator marks a point 1,000 feet from the end of the runway. A row of green lights indicates the threshold runway.

Simplified Short Approach Lighting System with Sequenced Flashing Lights

The Simplified Short Approach Lighting System with Sequenced Flashing Lights (SSALF) is a system of medium-intensity lights marking the extended runway centerline for 1,400 feet. The system presents to the pilot the illusion of a ball of light traveling from the outer end of the system (1,400 feet) to a point 1,000 feet from the end of the runway. A special indicator marks a point 1,000 feet from the end of the runway. A row of green lights indicates the threshold runway.

Touchdown Zone Lighting

A Touchdown Zone Lighting (TDZL) consists of two rows of transverse light bars located symmetrically about the runway centerline normally at 100-foot intervals. The basic system extends 3,000 feet along the runway.

Very High Frequency Omnidirectional Range

The Very High Frequency Omnidirectional Range (VOR) is a ground-based radio navigation aid that broadcasts azimuth information to aircraft. VORs broadcast on assigned channels and include the facility identification in Morse code for pilot monitoring and verification. Some VORs are capable of broadcasting weather information and supporting pilot-controller communcations although these capabilities are typically provided by other infrastructure systems. In addition to providing en route and terminal area azimuth guidance, VORs also support nonprecision instrument approach operations.

Currently, VORs are the primary radio navigation aid in the National Airspace System (NAS). They serve as the internationally designated standard short-distance radio navigation aid for air carrier and general aviation Instrument Flight Rules (IFR) operations.

VORs may be installed stand-alone or co-located with either a DME or TACAN system. When co-located the facility is typically referred to as a VOR/DME or VORTAC facility, respectively. This configuration allows pilots to determine their aircraft''s bearing and distance to a single location, i.e., fix.

With the advent of space-based navigation capabilities, a planned reduction in operational VORs will begin in approximately 2010. The reduction will result in a "backbone" minimum operational network (MON) that will support IFR operations at the busiest airports in the NAS while serving as a backup for space-based navigation.

Very High Frequency Omnidirectional Range Avionics

Very High Frequency Omnidirectional Range Avionics (VOR Avionics) receive, process, and display for the pilot the azimuth (bearing) to or from ground-based VOR transmitters.

Increasing numbers of aircraft are being equipped with GPS or WAAS avionics. However, since a reduced network of VOR stations is planned to continue in operation indefinitely as a backup to GPS, VOR avionics are expected to remain in service indefinitely in some aircraft.

Visual Approach Slope Indicator

A Visual Approach Slope Indicator (VASI) system is a light system that is accurately located alongside a runway to provide a visual glide slope to landing aircraft. VASIs radiate a directional pattern of high intensity, red and white focused light beams to form the glide path and are utilized primarily under Visual Flight Rules (VFR) conditions.

Wide Area Augmentation System

The Wide Area Augmentation System (WAAS) consists of a distributed array of Reference and Master Stations designed to provide range correction and integrity information messages that are used by WAAS-capable Global Positioning System (GPS)avionics to accurately determine an aircraft"s 3-dimensional position in space. Accurately surveyed WAAS Reference Stations (WRS) receive and process GPS satellite range data which is forwarded to redundant WAAS Master Stations (WMS) for additional processing before sending the resulting range-correction data to redundant WAAS Ground Uplink Stations (GUS). The GUS transmit the data to Geostationary (GEO) satellites which retransmit them on a GPS civil-use frequency for reception by GPS/WAAS avionics. The WAAS data enables aircraft to determine their position in the airspace with an accuracy that will enable, for WAAS-equipped aircraft, introduction of advanced navigation initiatives such as precision and non-precision approaches to airports throughout the NAS, and reduced longitudinal separation.

The WAAS service volume includes the contiguous United States, Hawaii, portions of Alaska and the Caribbean, and the US border areas with Canada and Mexico. Planned enhancement of WAAS with additional WRS and GEO satellites will improve the coverage and availability of WAAS. Enhancement of the GPS by the Department of Defense (DoD) will provide a second civil frequency for WAAS that will provide additional improvements in navigation performance throughout the NAS. This latter version of the WAAS will be termed the GPS Landing System (GLS).

Wide Area Augmentation System Avionics (key system)

Airborne Navigation Sensors Using the Global Positioning System (GPS) Augmented by the Wide Area Augmentation System (WAAS) combines navigation solutions from time and pseudoranges provided by the DoD Global Positioning System (GPS) satellites within view of the aircraft and pseudoranges provided by the Wide Area Augmentation (WAAS) geostationary satellites in view to compute navigation guidance with respect to courses selected by the flight crew. GPS/WAAS Avionics are approved for use as a primary means of navigation within the CONUS, where available, to satisfy en route, terminal area, and non-precision approaches providing lateral course guidance only. Lateral Navigation (LNAV)/Vertical Navigation (VNAV) non-precision approaches to lower minima are feasible using baro-altimeter avionics inputs. Lateral with Precision Vertical (LPV) guidance using GPS/WAAS Avionics to satisfy near Category I precision approaches with higher minima than ILS is also feasible, when approved under SIAP.

Support Activities

AF Procedure Development for Cat I-II-III Precision Approach Using LAAS

Airway Facilities procedures document the way airway facility operations are to be executed. The introduction of new systems, or changes to existing systems results in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

AF Training for Cat I-II-III Precision Approach Using LAAS

Airway Facilities (AF) training is provided to AF workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AF Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

Non-FAA Pilot Training for Cat I-II-III Precision Approach Using LAAS

Non-FAA Pilot Training is provided to educate pilots as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional pilot training. Training will generally begin 60 days prior to IOC and be complete within one year following Full Operating Capability.

People

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Interfaces

Global Positioning System — (Position Data) → Local Area Augmentation System Category I

LAAS Category I systems will be installed at airports which require a standalone navigation and landing capability and at airports where GPS/WAAS coverage is unable to meet existing Category I navigation and landing requirements due to insufficient satellite coverage or availability (i.e. some locations in Alaska). LAAS will provide precise correction data to airborne and surface receivers that will provide a navigation accuracy of less than 4 meters to distances of 20 miles or more from each runway end. The LAAS system is designed to collect data from GPS satellites in view, make the necessary corrections and transmit them via VHF broadcast to aircraft. LAAS will satisfy the need of providing all-weather approach and landing as well as surface navigation capabilities with significant improvements in service flexibility, safety, and user operating cost. LAAS will accomplish this through reduced siting constraints, and reduced ground and avionics installation cost. A single LAAS system will be capable of providing precision approach capabilities to multiple runways.

Global Positioning System — (Position Data) → Local Area Augmentation System Category II/III

LAAS consists of a precisely surveyed ground station with multiple Global Positioning System (GPS) receivers, a very high frequency (VHF) radio data broadcast (VDB), and possibly one or more pseudolites to increase availability. The LAAS ground station will receive, process, and communicate differential correction information, together with an integrity message, to aircraft avionics within a nominal radius of 20 to 30 nautical miles from the airport.

Global Positioning System — (Position Data) → Wide Area Augmentation System Avionics

WAAS (or GPS/WAAS) avionics consists of navigation sensors or stand-alone receiver/navigators which use GPS augmented by WAAS that combine navigation solutions from time and pseudoranges provided by the GPS satellites within view of the aircraft and pseudoranges provided by the WAAS GEOs in view to compute navigation guidance with respect to courses selected by the flight crew. GPS/WAAS avionics are approved for use as a primary means of navigation within the CONUS, where available, to satisfy en route, terminal area, and non-precision approaches providing lateral course guidance only. Lateral Navigation (LNAV)/Vertical Navigation (VNAV) approaches to lower minima are feasible using baro-altimeter avionics inputs. Lateral with Precision Vertical (LPV) guidance using GPS/WAAS avionics to support near Category I precision approaches with higher minima than ILS is also feasible, when approved under Standard Instrument Approach Procedures.

Issues

Backup precision landing capability for loss of GPS/LAAS

Service Group Air Traffic Services

Service Navigation

Capability Surface Guidance

Operational Improvement

Current Airport Surface Guidance (107201)

Aircraft use runway and taxiway lighting, markage, and signage for movement on an airport.

14-Sep-1996 to 14-Sep-2020

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Aircraft movement on airports is guided by runway and taxiway lighting, markage, and signage.

Benefits

Current operations are provided in the NAS.

Systems

Airport Surface Detection Equipment Model X

The Airport Surface Detection Equipment Model X (ASDE-X) consists of a primary radar subsystem, multilateration subsystem, data fusion subsystem, and a display. ASDE-X will detect, identify and track targets; project target paths, and alert controllers to possible conflicts. Interfaces with other Air Traffic Control (ATC) automation systems will provide arrival aircraft data tag including position, and aircraft identification, and predicted runway information.

Automatic Dependent Surveillance - Broadcast (Safe Flight-21) Avionics

Automatic Dependent Surveillance-Broadcast (Safe Flight 21) Avionics (ADS-B (SF-21) Avionics) are the surveillance avionics used by the Ohio Valley project under Safe Flight 21. These are demonstration avionics that are used to support ADS-B-related operational trials in the Ohio Valley. ADS-B automatically provides broadcast of the aircraft state vector (horizontal and vertical position, horizontal and vertical velocity and vehicle address). This broadcast is for the intended use as a surveillance, not an avoidance system.

Automatic Dependent Surveillance - Broadcast Avionics

Automatic Dependent Surveillance-Broadcast Avionics (ADS-B Avionics) transmits and receives Global Positioning System (GPS)-derived aircraft 4-dimensional position data, aircraft identification, aircraft velocity, and other selected aircraft data. Augmented GPS data may be required for certain applications. This is intended to be a surveillance system and not an avoidance system. The broadcast of own position is automatic and is intended to provide surveillance information to other users. The aircraft or vehicle originating the broadcast may not have knowledge of which users are receiving its broadcast. The ADS-B avionics are designed to transmit this 4-dimensional position data of own aircraft or vehicle and to also receive same type of information from others that are similarly equipped to receive and process ADS-B surveillance information.

Cockpit Display of Traffic Information Avionics

The Cockpit Display of Traffic Information Avionics (CDTI Avionics) is a generic name for a display that provides the flight crew with surveillance information about other proximate aircraft, including their position. It enables pilots to electronically "see and avoid" other aircraft.

Cockpit Display of Traffic Information for Safe Flight 21 Avionics

Cockpit Display of Traffic Information for Safe Flight 21 Avionics (CDTI (SF-21) Avionics) is the cockpit display avionics used by the Ohio Valley project under Safe Flight 21. These are demonstration displays that are used to support ADS-B-related operational trials in the Ohio Valley

Flight Management System

Flight Management System (FMS) is a computer system that uses a large database to allow routes to be preprogrammed and stored. The system is constantly updated with respect to position accuracy by reference to one or more conventional radio navigation aids (i.e., multi-sensor systems). The system may also use information from an inertial reference unit (IRU) or from a stand-alone inertial navigation system (INS). A sophisticated program and its associated database ensure that the most appropriate navaids are automatically selected during the update cycle. FMSs combine the relative position information from two or more point-referenced navigation aids such as VOR or DME to determine the absolute position of the aircraft (latitude, longitude). The resulting Area Navigation (RNAV) capability permits operation on any desired course.

Global Positioning System

The Global Positioning System (GPS) is a worldwide, all-weather, satellite-based navigation system developed, maintained & operated by the U.S Department of Defense, and managed by an Interagency executive board. GPS is a (nominal) 24 satellite constellation orbiting at approximately 12,000 miles above the earth in six planes. Each satellite broadcasts a precisely timed L-band signal on the same frequency. User GPS receivers, oboard aircraft, in ground vehicles or hand-held, receive and process the signals from all satellites in view, with a minimum of four satellites necessary to determine the receiver''s three-dimensional position (i.e., latitude, longitude and altitude), velocity (if applicable) and the precise time of day. GPS equipped aircraft can navigate on published jetways or utilize Area Navigation (RNAV) to fly any desired course between two locations.

GPS avionics built to TSO C-129 support en route and terminal area navigation, as well as non-precision instrument approach operations. Approval has been granted for properly certified GPS avionics to be used as a primary means of navigation in oceanic airspace and in certain remote areas. In July 2003 the Wide Area Augmentation System (WAAS)was commissioned to augment the GPS signal to meet primary navigation service requirements for accuracy, coverage, availability, and integrity.

Global Positioning System Avionics

Global Positioning System (GPS) Avionics process the signals received from four or more GPS satellites and determine the three-dimensional position (i.e., latitude, longitude and altitude) and velocity of an aircraft, as well as the precise time of day. GPS avionics provide an Area Navigation (RNAV) capability that permits operation on any desired course.

GPS avionics built to TSO-C129 do not have augmentation (WAAS, LAAS) and are approved only as a supplemental navigation system in the NAS, meaning that they must be used in conjunction with a primary navigation system. TSO-C129 avionics support en route and terminal area navigation, as well as non-precision instrument approach operations. Approval has been granted for properly certified GPS avionics to be used as a primary means of navigation in oceanic airspace and in certain remote areas. In certain regions of the world (including the NAS), GPS will be augmented (Wide Area and Local Area systems) to satisfy additional requirements for accuracy, coverage, availability, and integrity. Augmented GPS avionics (WAAS, LAAS) are expected to support precision instrument approach operations, and to gain approval as a primary navigation system throughout the NAS. It is anticipated that users will migrate from TSO-C129 avionics to augmented GPS avionics (WAAS, LAAS).

Runway Centerline Lighting (key system)

Runway Centerline Lighting (RWCLL) consists of flush centerline lights spaced at 50-foot intervals beginning 75 feet from the landing threshold and extending to within 75 feet of the opposite end of the runway.

Runway Lights/Runway Edge Lights (key system)

Runway Lights/Runway Edge Lights (RL/REL) are lights having a prescribed angle of emission used to define the lateral limits of a runway. Runway lights are uniformly spaced at intervals of approximately 200-feet, and the intensity may be controlled or preset.

Runway lights and ruuway edge lights are procured, installed, and maintained by the airport. The FAA is not involved with these light systems other than publishing the necssary lighting standards which the airport uses for guidance.

WAAS Corrections Broadcast Service

WAAS Corrections Broadcast Service is comprised of both Space-based and Ground Earth Station components.

Geostationary Earth Orbit (GEO) satellites receive Wide Area Augmentation System (WAAS) correction and integrity information transmitted by Ground Earth Stations (in WAAS terms referred to as Ground Uplink Stations (GUSs)) with information re-broadcast for WAAS avionics reception and use. Current broadcast service leased from INMARSAT".

Wide Area Augmentation System

The Wide Area Augmentation System (WAAS) consists of a distributed array of Reference and Master Stations designed to provide range correction and integrity information messages that are used by WAAS-capable Global Positioning System (GPS)avionics to accurately determine an aircraft"s 3-dimensional position in space. Accurately surveyed WAAS Reference Stations (WRS) receive and process GPS satellite range data which is forwarded to redundant WAAS Master Stations (WMS) for additional processing before sending the resulting range-correction data to redundant WAAS Ground Uplink Stations (GUS). The GUS transmit the data to Geostationary (GEO) satellites which retransmit them on a GPS civil-use frequency for reception by GPS/WAAS avionics. The WAAS data enables aircraft to determine their position in the airspace with an accuracy that will enable, for WAAS-equipped aircraft, introduction of advanced navigation initiatives such as precision and non-precision approaches to airports throughout the NAS, and reduced longitudinal separation.

The WAAS service volume includes the contiguous United States, Hawaii, portions of Alaska and the Caribbean, and the US border areas with Canada and Mexico. Planned enhancement of WAAS with additional WRS and GEO satellites will improve the coverage and availability of WAAS. Enhancement of the GPS by the Department of Defense (DoD) will provide a second civil frequency for WAAS that will provide additional improvements in navigation performance throughout the NAS. This latter version of the WAAS will be termed the GPS Landing System (GLS).

Wide Area Augmentation System Avionics

Airborne Navigation Sensors Using the Global Positioning System (GPS) Augmented by the Wide Area Augmentation System (WAAS) combines navigation solutions from time and pseudoranges provided by the DoD Global Positioning System (GPS) satellites within view of the aircraft and pseudoranges provided by the Wide Area Augmentation (WAAS) geostationary satellites in view to compute navigation guidance with respect to courses selected by the flight crew. GPS/WAAS Avionics are approved for use as a primary means of navigation within the CONUS, where available, to satisfy en route, terminal area, and non-precision approaches providing lateral course guidance only. Lateral Navigation (LNAV)/Vertical Navigation (VNAV) non-precision approaches to lower minima are feasible using baro-altimeter avionics inputs. Lateral with Precision Vertical (LPV) guidance using GPS/WAAS Avionics to satisfy near Category I precision approaches with higher minima than ILS is also feasible, when approved under SIAP.

People

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Interfaces

no interfaces

Issues

Funding of ground and space based systems to ensure this capability is implemented to improve airport safety and to assist in preventing runway incursions.

Service Group Air Traffic Services
Service Navigation
Capability Surface Guidance

Operational Improvement

Provide Low Visibility Operations (107202)

Aircraft and ground vehicle movement on airports in low visibility conditions is guided by accurate location information and moving map displays.

30-Jun-2008 to 31-Dec-2027

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Aircraft and ground vehicles determine their position on an airport from GPS and LAAS, Automatic Dependent Surveillance-Broadcast (ADS-B) and Ground-Based Transceivers (GBT) systems, or ground-based multilateration systems. Location information of moving and static aircraft and vehicles on the airport surface is displayed on moving maps using Cockpit Display of Traffic Information (CDTI) or virtual vision technology.

Benefits

Improved airport surface safety and capacity.

Systems

Airport Surface Detection Equipment Model X

The Airport Surface Detection Equipment Model X (ASDE-X) consists of a primary radar subsystem, multilateration subsystem, data fusion subsystem, and a display. ASDE-X will detect, identify and track targets; project target paths, and alert controllers to possible conflicts. Interfaces with other Air Traffic Control (ATC) automation systems will provide arrival aircraft data tag including position, and aircraft identification, and predicted runway information.

Automatic Dependent Surveillance (Safe Flight 21) Ground Station

The Automatic Dependent Surveillance (Safe Flight 21) Ground Station (ADS (SF-21) Ground Station) is a demonstration system used by the Ohio Valley project under the Safe Flight 21 program. It receives Global Positioning System (GPS)-derived aircraft four (4)-dimensional position data, aircraft identification, aircraft velocity, and other selected aircraft data for processing at selected ATC facilities, and transmits Traffic Information System - Broadcast (TIS-B) information on aircraft in areas of radar coverage (and other airspace status information when available) to properly to equipped aircraft, to support SF-21 operational trials. These ground stations will be located in the regions surrounding Memphis, TN and Louisville, KY, and interface with developmental surveillance processing systems.

Automatic Dependent Surveillance - Broadcast (Safe Flight-21) Avionics

Automatic Dependent Surveillance-Broadcast (Safe Flight 21) Avionics (ADS-B (SF-21) Avionics) are the surveillance avionics used by the Ohio Valley project under Safe Flight 21. These are demonstration avionics that are used to support ADS-B-related operational trials in the Ohio Valley. ADS-B automatically provides broadcast of the aircraft state vector (horizontal and vertical position, horizontal and vertical velocity and vehicle address). This broadcast is for the intended use as a surveillance, not an avoidance system.

Automatic Dependent Surveillance - Broadcast Avionics

Automatic Dependent Surveillance-Broadcast Avionics (ADS-B Avionics) transmits and receives Global Positioning System (GPS)-derived aircraft 4-dimensional position data, aircraft identification, aircraft velocity, and other selected aircraft data. Augmented GPS data may be required for certain applications. This is intended to be a surveillance system and not an avoidance system. The broadcast of own position is automatic and is intended to provide surveillance information to other users. The aircraft or vehicle originating the broadcast may not have knowledge of which users are receiving its broadcast. The ADS-B avionics are designed to transmit this 4-dimensional position data of own aircraft or vehicle and to also receive same type of information from others that are similarly equipped to receive and process ADS-B surveillance information.

BSGS Broadcast Services Ground Station (key system)

The BSGS (Broadcast Services Ground Station) supports Air-Ground broadcast services. This includes the reception of ADS-B from equipped aircraft/vehicles and the transmission of Traffic Information Service-Broadcast (TIS-B) and Flight Information Service-Broadcast (FIS-B) for use by equipped aircraft. Generally, the BSGS will interface via the SDN to provide ADS-B information to ATC automation and receive TIS-B and FIS-B information from TIS-B and FIS-B servers. The BSGS includes antenna(s), one or more dual link (i.e., 1090 MHz Extended Squitter-1090ES and Universal Access Transceiver-UAT) Ground Based Transceiver(s)(GBT), processing functions and communications functions. Several configurations of the BSGS are required to support variations in the geographic service volume and functions to be supported at specific categories of operational sites. BSGSs will be installed at 448 airports and 100 en route locations. Included are those airports equipped with Secondary Surveillance Radar (SSR) and about 140 additional towered airports (currently without SSR). The BSGS will support ADS-B and TIS-B services via both the 1090ES link and by the UAT link. The BSGS will also support FIS-B via the UAT link. BSGSs incorporate a multilink gateway function that provides ADS-B rebroadcasts via the ADS-B alternate link. A BSGS incorporating 2 GBTs are required for airport surface and terminal surveillance coverage at each of 268 smaller airports, a BSGS incorporating 3 GBTs (on average) are required at 120 of the mid-sized airports, and a BSGS incorporating 6 GBTs (on average) are required at the 60 largest airport (those equipped with ASDE-X or ASDE-3 surface surveillance systems).

The following BSGS functions are required to support the various categories of NAS BSGS sites, except as noted below: (1) 1090ES and UAT receive/transmit (i.e., the GBT funnction); (2) multi-link gateway function; (3) process received ADS-B messages and output (via the SDN) ADS-B reports for use by ATC automation; (4) accept TIS-B and FIS-B information from ground TIS-B/FIS-B servers and manage the generation and broadcast of link specific TIS-B messages via the 1090ES and UAT links and FIS-B messages via the UAT link.

The following BSGS configurations are assumed based on the category of the operational site. Except as noted below all BSGS configuration support the above described functions.

En route (100 sites): (1) One multi-sector antenna with each sector connected to the individual 1090ES and UAT receivers. Supports up to 250 nmi. ADS-B reception. En route locations that are intended to provide only low-altitude gap filler coverage do not require the long-range capability. (2) One omni-directional transmit antenna. Transmitter power sized to support the required TIS-B and FIS-B coverage for that specific site.

Terminal/Airport without ASDE-X (415 airports incl. 27 ASDE-3 equipped airports) with each site having: (1) BSGS with at least 2 GBTs with omni-directional antennas sited for both airport surface and terminal airspace coverage; (2) additional GBTs as needed to provide coverage of the primary airport surface movement area.

Terminal/Airport with ASDE-X (26 ASDE-X plus 7 upgraded ASDE-3 airports with an average of 6 GBTs per BSGS): (1) ASDE-X ground stations upgraded to support GBT functionality; (2) At least two of the GBTs provide ADS-B coverage to the edge of the terminal airspace and the TIS-B coverage; (3) ASDE provides the surveillance data source to support TIS-B for surface traffic.

Cockpit Display of Traffic Information Avionics (key system)

The Cockpit Display of Traffic Information Avionics (CDTI Avionics) is a generic name for a display that provides the flight crew with surveillance information about other proximate aircraft, including their position. It enables pilots to electronically "see and avoid" other aircraft.

Cockpit Display of Traffic Information for Safe Flight 21 Avionics

Cockpit Display of Traffic Information for Safe Flight 21 Avionics (CDTI (SF-21) Avionics) is the cockpit display avionics used by the Ohio Valley project under Safe Flight 21. These are demonstration displays that are used to support ADS-B-related operational trials in the Ohio Valley

Enhanced Vision System (key system)

The Enhanced Vision System uses an infrared camera to provide the pilot with enhanced situational awareness during poor weather conditions and during nighttime approaches and landings.

Flight Management System

Flight Management System (FMS) is a computer system that uses a large database to allow routes to be preprogrammed and stored. The system is constantly updated with respect to position accuracy by reference to one or more conventional radio navigation aids (i.e., multi-sensor systems). The system may also use information from an inertial reference unit (IRU) or from a stand-alone inertial navigation system (INS). A sophisticated program and its associated database ensure that the most appropriate navaids are automatically selected during the update cycle. FMSs combine the relative position information from two or more point-referenced navigation aids such as VOR or DME to determine the absolute position of the aircraft (latitude, longitude). The resulting Area Navigation (RNAV) capability permits operation on any desired course.

Global Positioning System

The Global Positioning System (GPS) is a worldwide, all-weather, satellite-based navigation system developed, maintained & operated by the U.S Department of Defense, and managed by an Interagency executive board. GPS is a (nominal) 24 satellite constellation orbiting at approximately 12,000 miles above the earth in six planes. Each satellite broadcasts a precisely timed L-band signal on the same frequency. User GPS receivers, oboard aircraft, in ground vehicles or hand-held, receive and process the signals from all satellites in view, with a minimum of four satellites necessary to determine the receiver''s three-dimensional position (i.e., latitude, longitude and altitude), velocity (if applicable) and the precise time of day. GPS equipped aircraft can navigate on published jetways or utilize Area Navigation (RNAV) to fly any desired course between two locations.

GPS avionics built to TSO C-129 support en route and terminal area navigation, as well as non-precision instrument approach operations. Approval has been granted for properly certified GPS avionics to be used as a primary means of navigation in oceanic airspace and in certain remote areas. In July 2003 the Wide Area Augmentation System (WAAS)was commissioned to augment the GPS signal to meet primary navigation service requirements for accuracy, coverage, availability, and integrity.

Global Positioning System Avionics

Global Positioning System (GPS) Avionics process the signals received from four or more GPS satellites and determine the three-dimensional position (i.e., latitude, longitude and altitude) and velocity of an aircraft, as well as the precise time of day. GPS avionics provide an Area Navigation (RNAV) capability that permits operation on any desired course.

GPS avionics built to TSO-C129 do not have augmentation (WAAS, LAAS) and are approved only as a supplemental navigation system in the NAS, meaning that they must be used in conjunction with a primary navigation system. TSO-C129 avionics support en route and terminal area navigation, as well as non-precision instrument approach operations. Approval has been granted for properly certified GPS avionics to be used as a primary means of navigation in oceanic airspace and in certain remote areas. In certain regions of the world (including the NAS), GPS will be augmented (Wide Area and Local Area systems) to satisfy additional requirements for accuracy, coverage, availability, and integrity. Augmented GPS avionics (WAAS, LAAS) are expected to support precision instrument approach operations, and to gain approval as a primary navigation system throughout the NAS. It is anticipated that users will migrate from TSO-C129 avionics to augmented GPS avionics (WAAS, LAAS).

Local Area Augmentation System Avionics

Local Area Augmentation System Avionics uses position corrections provided by GPS and WAAS that are received through a VHF communications data link using existing VOR frequencies to provide a space-based precision approach navigation capability to the NAS that meets the requirements for all weather approach and landing capability. Additionally, LAAS Avionics provides a signal consisting of position, velocity, and time (PVT) that may be used in applications to support surface vehicle location.

Local Area Augmentation System Category I

The Local Area Augmentation System Category I (LAAS CAT I) is a safety-critical precision navigation and landing system that augments Global Positioning System (GPS)range data to provide aircraft position accuracy necessary for CAT I precision approaches; i.e., 200 foot decision height and one-half mile visibility. LAAS will provide service to suitably equipped users for runways equipped with required peripheral systems; e.g., Approach zone Runway Visual Range (RVR) and Approach Lighting System (ALS). The LAAS signal-in-space will provide: (1) local area differential corrections for GPS satellites and WAAS Geostationary Earth Orbit (GEO) satellites; (2) the associated integrity parameters; and (3) the path points that describe the final approach segment.

The LAAS CAT I will utilize multiple GPS reference receivers and their associated antennas, all located within the airport boundary, to receive and decode the GPS and WAAS GEO range measurements and navigation data. The LAAS information is broadcast to aircraft operating in the local terminal area (nominally 20 nautical miles (nmi)) via a LAAS very high frequency (VHF) data broadcast (VDB) transmission.

Local Area Augmentation System Category I Technological Refresh

LAAS CAT I Tech Refresh periodically (5-7 years) replaces Line Replaceable Units (LRUs) that lifecycle engineering analyses determine will become unsupportable. Tech Refresh will not increase the LAAS'' functionality.

Local Area Augmentation System Category II/III

The CAT II/III Local Area Augmentation System (LAAS) will provide guidance that meets the accuracy, integrity and availabililty requirements for CAT II and III precision approaches. The Wide Area Augmentation System (WAAS) and LAAS will provide a seamless satellite-based navigation capability for all phases of flight.

CAT II/III LAAS is an ongoing R&D effort which, if successful, is envisioned to lead to a follow-on development and procurement program. CAT II/III LAAS installations might ultimately complement or replace the CAT II/III Instrument Landing Systems (ILS) that are currently in the NAS.

LAAS consists of a precisely surveyed ground station with multiple Global Positioning System (GPS) receivers, a very high frequency (VHF) radio data broadcast (VDB), and possibly one or more pseudolites to increase availability. The LAAS ground station will receive, process, and communicate differential correction information, together with an integrity message, to aircraft avionics within a nominal radius of 20 to 30 nautical miles from the airport.

Pseudolite ground-based transmitters that transmit GPS-like signals may be required to ensure the LAAS performs to CAT II/III requirements. Peudolites can be used as a data link (to transmit differential corrections and integrity status to user platforms) and as supplementary ranging sources for LAAS. Pseudolites used as ranging sources can improve system accuracy by improving the local constellation geometry and system availability.

Local Area Augmentation System Category II/III Technological Refresh

LAAS CAT II/III Tech Refresh periodically (5-7 years) replaces Line Replaceable Units (LRUs) that lifecycle engineering analyses determine will become unsupportable. Tech Refresh will not increase the LAAS'' functionality.

Runway Centerline Lighting

Runway Centerline Lighting (RWCLL) consists of flush centerline lights spaced at 50-foot intervals beginning 75 feet from the landing threshold and extending to within 75 feet of the opposite end of the runway.

Runway Lights/Runway Edge Lights

Runway Lights/Runway Edge Lights (RL/REL) are lights having a prescribed angle of emission used to define the lateral limits of a runway. Runway lights are uniformly spaced at intervals of approximately 200-feet, and the intensity may be controlled or preset.

Runway lights and ruuway edge lights are procured, installed, and maintained by the airport. The FAA is not involved with these light systems other than publishing the necssary lighting standards which the airport uses for guidance.

Surface Traffic Information Processor (key system)

The STIP would be an extension of the Automatic Dependent Surveillance-Broadcast (ADS-B)/Traffic Information Service - Broadcast (TIS-B) capability at 60 large airports equipped with Airport Surface Detection Equipment (ASDE) Model X or Model 3 systems. A processor would be added at each of these airports to support Traffic Information Service-Broadcast (TIS-B) services for surface and nearby low-altitude traffic. The STIP will receive surveillance information from the ASDE-X or ASDE-3 system and generate TIS-B messages for delivery by the Broadcast Services Ground Stations (BSGSs) providing surface coverage at that airport. The STIP will support of subset of the functionality of the TIS-FIS Broadcast Server (that is intended to support TIS-B for airborne users), but the STIP will support a more real-time TIS-B service with a higher update rates and lower latency consistent with the available surface surveillance data source and the needs to support surface movement operations.

Surface Vehicle Identification System

The Surface Vehicle Identification System (SVIS) is a ground vehicle Automatic Dependent Surveillance-Broadcast (ADS-B) system, which uses augmented Global Positioning System (GPS) data to determine its current position. SVIS broadcasts the vehicle position and discrete identification code for use by the airport surface Automatic Dependent Surveillance (ADS) system.

TIS-FIS Broadcast Server (key system)

TIS-FIS Broadcast Servers are located at 22 Air Route Traffic Control Centers and 8 consolidated Terminal Radar Approach Controls/Integrated Control Complex (ICC). TIS-Broadcast (TIS-B) is needed unless full Automatic Dependent Surveillance-Broadcast equipage is achieved. Servers will receive surveillance data (i.e., based on Secondary Surveillance Radar, etc.), from the Surveillance Data Processor (SDP), in the form of Surveillance Data Objects for each target aircraft and will create TIS-B reports. Servers will receive FIS data from weather processors. The TIS and FIS data will be geographically filtered for the defined service volume of each Broadcast Services Ground Station (BSGS), and TIS data will also be filtered for only non-ADS-B-equipped targets.

WAAS Corrections Broadcast Service

WAAS Corrections Broadcast Service is comprised of both Space-based and Ground Earth Station components.

Geostationary Earth Orbit (GEO) satellites receive Wide Area Augmentation System (WAAS) correction and integrity information transmitted by Ground Earth Stations (in WAAS terms referred to as Ground Uplink Stations (GUSs)) with information re-broadcast for WAAS avionics reception and use. Current broadcast service leased from INMARSAT''.

Wide Area Augmentation System

The Wide Area Augmentation System (WAAS) consists of a distributed array of Reference and Master Stations designed to provide range correction and integrity information messages that are used by WAAS-capable Global Positioning System (GPS)avionics to accurately determine an aircraft''s 3-dimensional position in space. Accurately surveyed WAAS Reference Stations (WRS) receive and process GPS satellite range data which is forwarded to redundant WAAS Master Stations (WMS) for additional processing before sending the resulting range-correction data to redundant WAAS Ground Uplink Stations (GUS). The GUS transmit the data to Geostationary (GEO) satellites which retransmit them on a GPS civil-use frequency for reception by GPS/WAAS avionics. The WAAS data enables aircraft to determine their position in the airspace with an accuracy that will enable, for WAAS-equipped aircraft, introduction of advanced navigation initiatives such as precision and non-precision approaches to airports throughout the NAS, and reduced longitudinal separation.

The WAAS service volume includes the contiguous United States, Hawaii, portions of Alaska and the Caribbean, and the US border areas with Canada and Mexico. Planned enhancement of WAAS with additional WRS and GEO satellites will improve the coverage and availability of WAAS. Enhancement of the GPS by the Department of Defense (DoD) will provide a second civil frequency for WAAS that will provide additional improvements in navigation performance throughout the NAS. This latter version of the WAAS will be termed the GPS Landing System (GLS).

Wide Area Augmentation System Avionics

Airborne Navigation Sensors Using the Global Positioning System (GPS) Augmented by the Wide Area Augmentation System (WAAS) combines navigation solutions from time and pseudoranges provided by the DoD Global Positioning System (GPS) satellites within view of the aircraft and pseudoranges provided by the Wide Area Augmentation (WAAS) geostationary satellites in view to compute navigation guidance with respect to courses selected by the flight crew. GPS/WAAS Avionics are approved for use as a primary means of navigation within the CONUS, where available, to satisfy en route, terminal area, and non-precision approaches providing lateral course guidance only. Lateral Navigation (LNAV)/Vertical Navigation (VNAV) non-precision approaches to lower minima are feasible using baro-altimeter avionics inputs. Lateral with Precision Vertical (LPV) guidance using GPS/WAAS Avionics to satisfy near Category I precision approaches with higher minima than ILS is also feasible, when approved under SIAP.

Wide Area Augmentation System Technology Refresh

Elements of WAAS technical refresh consist of two paths. One is improvement to operational capability that enhances performance of WAAS. The other is the known replacement of equipment, including hardware, software, and telecommunications links and networks within the WAAS WMS and GUS.

Technical refresh is subject to "re-baselining" activity that is currently underway and the FAA will make a corporate decision in September 2004.

Support Activities

AF Procedure Development Low Visibility Operations

Airway Facilities procedures document the way airway facility operations are to be executed. The introduction of new systems, or changes to existing systems results in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

AF Training for Low Visibility Operations

Airway Facilities (AF) training is provided to AF workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AF Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

Non-FAA Pilot Training for Low Visibility Operations

Non-FAA Pilot Training is provided to educate pilots as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional pilot training. Training will generally begin 60 days prior to IOC and be complete within one year following Full Operating Capability.

People

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Interfaces

BSGS Broadcast Services Ground Station ← (Target Data) → Surface Traffic Information Processor

BSGS antennas provide target data to the SMLSP for processing to support multilateration surveillance and Traffic Information Service-Broadcast (TIS-B) services for surface and low-altitude traffic. The processed data is then sent back to the BSGS for broadcasting.

BSGS Broadcast Services Ground Station ← (Target Data) → TIS-FIS Broadcast Server

The TIS-FIS Broadcast Server exchanges data with the BSGS to form a surveillance broadcast reports, which are then broadcasted to users via the BSGS.

TIS-FIS Broadcast Server — (Weather Data) → BSGS Broadcast Services Ground Station

FIS graphical weather products from the TIS-FIS Broadcast Server are sent to the BSGS for broadcasting.

Issues

Aircraft and vehicle equipage.

Service Group Air Traffic Services

Service TM-Strategic Flow

Capability Flight Day Management

Operational Improvement

Current Flight Day Management (105201)

Participating aircraft operation centers and the FAA have real-time access to current NAS status information, including infrastructure and operational factors. There is an electronic exchange of NAS status information and flight plan information, and interactive decision support tools increase NAS user and traffic manager flexibility to manage flight operations under current constraints, such as special use airspace, equipment and facility status, and weather conditions. The airlines and Traffic Management improve in exchanging information and negotiating flight plan changes in a near real-time ability (Free Flight Phase 1 activity).

29-May-2002 to 31-Dec-2002

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Every day the performance of the National Airspace System (NAS) is monitored and assessed on a continuous basis. The primary responsibility for performance assessment is assigned to the David J. Hurley Air Traffic Control System Command Center (ATCSCC) located in Herndon, Virginia. Assessments include determining airspace and airport capacity and possible constraints on the system. Various systems along with Traffic Management (TM) units in all the major facilities are utilized to collect data to assist in the analysis. Key personnel at various facilities and the user community collaborate on decisions to mitigate constraints on the system. This process is called Collaborative Decision Making (CDM).

The TM specialist at the ATCSCC collects initial runway configurations and airport acceptance rates from the TM coordinators at the associated Air Route Traffic Control Centers (ARTCC) or Terminal Radar Approach Control (TRACON) facilities. The current airport acceptance rate is determined by runway configuration, weather, equipment availability, and runway/taxiway closures. This information is collected for the busiest commercial airports in the NAS. This collection of data can occur via the voice switch systems at the various facilities, or via Enhanced Traffic Management System (ETMS) equipment.

ARTCC Weather Service Unit (CWSU) personnel derive initial aviation weather data for the day from previous day forecasts and a first observation of the current day through the weather and radar processor. Subsequent aviation weather data is collected from numerous sources. Each large Airline Operations Center (AOC) and air cargo operations center has their own meteorological staff, or they purchase weather products from private vendors. Most AOCs have dedicated CDM workstations used in the CDM process. All FAA ARTCC facilities have a CWSU staffed by National Weather Service meteorologists. The ATCSCC also has its own weather personnel. These weather professionals combine their levels of expertise to produce a consensus weather forecast product for use by all participants in the CDM process. The product is referred to as the Collective Convective Forecast Product (CCFP) and is published mid-morning to all CDM participants. Additional types of information are shared using the NAS Status Information system. Constraints to the en route airspace system, the airspace between the airports, are analyzed. These constraints include weather, military activity, space vehicle launches and recoveries, VIP movements, and other restrictions to airspace use. Based on the en route constraints, predicted en route sector loading is analyzed. The objective of this analysis is to route aircraft around or through constrained airspace in an orderly manner and prevent en route sector overload.

Equipment outages can adversely impact the capacity of the NAS. The National Operations Command Center (NOCC) located at the ATCSCC tracks unscheduled outages and coordinates the scheduling of planned outages. Airway facilities personnel, knowledgeable about equipment requirements, staff the NOCC. The NOCC provides equipment status information to the National Operations Manager for use in NAS performance assessment.

After all pertinent data is collected and analyzed, modeling of various traffic management initiatives is accomplished by the ATCSCC and the impacted ARTCCs, TRACONs, stand alone Air Traffic Control Towers, and/or AOC. The intent of the modeling is to mitigate each constraint to the NAS using the minimum restriction necessary to relieve the situation. The modeling can show the impact of the proposed restriction on the sectors that would work the rerouted traffic. Modeling is accomplished using methods from simple chalkboard drawings, or by using computer-modeling programs such as Post Operation Evaluation Tool (POET). Additionally, each initiative must be integrated with other restrictions currently in place for overall system effectiveness. The following are the initiatives available to planners to mitigate system constraints:

Airport specific programs are designed to deliver certain hourly numbers of arrival aircraft to an airport. The Flight Schedule Analyzer (FSA) on a real time basis analyzes Ground Delay Programs. Ground stops are airport specific programs, generally short term in nature, which stops, on the ground, some or all arrivals to a specified airport or metropolitan area. Miles-In-Trail are the most widely used restriction to slow and spread out traffic. This type restriction can be airport, airway, facility, or sector specific. This type restriction usually has time and altitude parameters.

Coded Departure Routes provide alternate departure routings to allow aircraft to enter the NAS on routes that avoid impacted airspace or to accommodate sector loading reduction efforts. Additionally the National Playbook contains published routings to and from certain airports utilized to bypass constricted airspace. A Severe Weather Avoidance Plan publishes routings circumventing geographic areas that are being impacted by severe weather.

Other diversion techniques include: routing aircraft through less congested, lower altitude sectors or TRACON airspace when optimum higher altitudes are saturated; and severe weather diversion, where aircraft are diverted from their planned destinations to alternate destinations.

The CDM process uses these techniques for strategic planning and requires that all participants utilize common, agreed upon data. The CCFP and the FSA data are examples of necessary common data. This data is based on the FAAs ETMS and made available to all users through Web-based technology using a privately-owned network called CDMnet.

Once the constraints to the capacity of the NAS are defined, analyzed, and possible solutions have been modeled by the ATCSCC, FAA field facilities and the AOCs participate in a Strategic Planning Telcon (SPT) to determine a course of action. The SPT is scheduled on a periodic basis, the frequency is determined by operational circumstances impacting the participants. Prior to the SPT, coordination between facilities and users to explore common strategies is required. The ATCSCC sets the agenda for the SPT and requests participation from involved stakeholders. The involved stakeholders are determined by the airspace involved, the users impacted, and FAA facilities that may be impacted by various solutions.

The SPT is a collaborative effort in which all participants are actively seeking the most advantageous mitigation to an airport or airspace constriction in the NAS. The length of the SPT depends on the number of constraints in the system and the complexity of the situations and resolutions. The ATCSCC conducts the SPT and, in theory, is there to resolve conflicts in proposed solutions. In practice, the CDM process almost always results in consensus among the stakeholders about proposed resolutions.

After the SPT is complete the ATCSCC publishes a Strategic Plan of Operations (SPO). The SPO contains the written results of the CDM process and is used by all stakeholders to execute the plan.

Other Actions

Tactical operation responses to constraints to the NAS are coordinated by the ATCSCC Severe Weather Group. This group reacts to unscheduled events such as pop-up thunderstorms and facility/navaid outages. Their available actions are the same as the strategic planners. A tactical action by this group may be incorporated in the next SPT process. ATCSCC is tasked with monitoring compliance with both the strategic and tactical restrictions currently in use in the NAS.

Airport resources are managed by slot allocation, a process by which arrival times are planned based on all aircraft demands for service. This process is used daily at certain airports and during certain special events at other airports. The ATCSCC controls these programs. For special event purposes at certain airports, pilots request and obtain approval for arrival and/or departure reservations or slots utilizing an interactive computer system. This system is called the Computer Voice Reservation System.

Diversion recovery, if the NAS becomes restricted to the level requiring the diverting of aircraft to airports other than their original destination, is a plan to recover the aircraft to a location that meets airline-scheduling needs, but usually to the original destination. This plan ensures that a flight does not suffer a diversion as well as additional delays. This planning involves close coordination between the ATCSCC and the associated AOC.

Benefits

Current operations are provided in the NAS.

Systems

Collaborative Decision Making Workstation (key system)

The Collaborative Decision Making Workstation (CDM Workstation) is the hardware and software suite used to display output from CDM tools in the Airline Operations Centers (AOCs). This hardware and software is not owned or supported by the FAA.

Collaborative Routing and Coordination Tool (key system)

The Collaborative Routing and Coordination Tool (CRCT) consists of the hardware and software required to designate areas of severe weather or congestion as Flow Constrained Areas (FCA), identify flights predicted to enter the FCA, and assess the impact of rerouting flights identified on the en route traffic control center sector loading.

Enhanced Traffic Management System (key system)

The Enhanced Traffic Management System (ETMS) application is at the heart of the Traffic Flow Management (TFM) system, and through it flows the network of all TFM interfaces. ETMS at the Command Center deals with the strategic flow of air traffic at the national level. ETMS at remote facilities is used for local airspace management within the local facility''s own area of responsibility. To facilitate coordination between the Traffic Management Coordinators (TMC) at remote Traffic Management Units (TMUs) and the Traffic Management Specialists (TMS) at the Air Traffic Control System Command Center (ARTSCC), each local ETMS may can also view the national composite picture of traffic for which the Command Center has responsibility. ETMS enables TMS and TMC personnel to track and predict traffic flows, analyze effects of ground delays or weather delays, evaluate alternative routing strategies, and plan traffic flow patterns.

The ETMS central hub is located at the Volpe National Transportation System Center. The hub collects flight schedules, and revisions, from NAS users, and collects actual traffic situation updates from local ETMS TMUs, and combines these with planned traffic initiatives (e.g., Ground Delay Programs) to generate an Aggregate Demand List (ADL) that is output to users every five (5) minutes. The ADL contains predicted arrival and departure traffic at individual airports. NAS users, e.g., air carriers, can access the ADL data to plan and revise their flight schedules to work more efficiently with planned traffic initiatives. This interactive process of flight planning gives users more input to TMCs on how traffic initiatives will affect them and is the heart of the Collaborative Decision Making (CDM) process.

Traffic Management Units (TMUs) are located throughout the NAS amd perform local flow control management functions. TMUs exist in all Air Route Traffic Control Centers (ARTCCs), 35 high activity Terminal Radar Approach Control (TRACONs), 8 Air Traffic Control Towers (ATCTs), 3 Center Radar Approach (CERAP) facilities, and the WJHTC. TMU hardware suites are automated workstations that include computer entry/readout devices, network communications, Flight Strip Printer (FSP), and a Traffic Situation Display (TSD).

NAS users are responsible for providing their own connectivity to the ETMS hub. The various connective user networks are collectively referred to as the CDM Network (CDMnet) which provides two-way connectivity to ETMS. Non-FAA users do not have access to all ETMS data and processing tools.

Flight Schedule Analyzer

The Flight Schedule Analyzer (FSA) consists of post analysis (PA) and real-time (RT) components. PA FSA graphically shows data and analysis results on how well a Ground Delay Program (GDP) performed and what factors affected performance. RT FSA generates a collection of reports that allow the specialists at Airlines and the Air Traffic Control System Command Center (ATCSCC) to monitor GDPs of specific flights as they are executing. Real-time FSA may also be used to monitor "Pop Ups" (flights for which ETMS has no scheduling data) to airports. Airlines use FSA data to internally address situations to assess the effectiveness of GDP and to improve demand predictions. RT FSA is accessible from the ATCSCC intranet web page and generates reports including: (1) Performance, (2) Flight Status, (3) Compliance, (4) Cancelled flights that operated, (5) Pop-up flights, (6) Time-out delayed flights, and (7) GDP Program events.

Flight Schedule Monitor (key system)

The Flight Schedule Monitor (FSM) is the main tool for the traffic management specialist at the Air Traffic Control System Command Center (ATCSCC) to monitor, model, and implement Ground Delay Program (GDP) operations. FAA and airlines use FSM to monitor demand through receipt of FSM demand pictures of airports updated every 5 minutes. FSM constructs "what if" scenarios for best options (i.e., best parameters) prior to making a GDP decision. Modeling may be used by: (1) the ARTCC TMC to request ATCSCC implementation of a GDP in the event of significant congestion or if a demand/capacity imbalance is projected at an en route fix, route, or sector; (2) the ATCSCC to determine ARTCC start/end times, Airport Arrival Rate (AAR), and other paramters for a particular GDP scenario; and (3) the Airlines to see the effects of cancelling or delaying a specific flights under a GDP.

Reports from the FSM modeling tool for each GDP include: (1) Carrier Statistics showing total minutes of delay for each flight, (2) Airborne Holding Flight Lists of arrival slots, (3) FSM Slot list, (4) Surface Delay histograms, (5) CTA Compliance Alarms for violations of Arrival compliance, (6) CTD Compliance Alarms for violation of Departure compliance, (7) ETEs on significant differences between actual vs ETMS estimated times, and (8) Spurious Flight Alarms triggered upon cancellation of false flights in a substitution stream.

National Airspace System Status Information (key system)

National Airspace System Status Information (NASSI) is a database that provides FAA and NAS users a common view of the system status and safety information they require for shared situational awareness and effective traffic flow management decision making.

Post Operations Evaluation Tool (key system)

Post Operations Evaluation Tool (POET) is an analysis system that allows users of the National Airspace System (NAS), the Air Traffic Control System Command Center (ATCSCC), Air Route Traffic Control Centers (ARTCC), and other FAA facilities to review the functional status of the NAS and help analyze collaborative routing problems in identifying areas of NAS congestion or inefficiency. A variety of performance metrics (e.g., departure, en route, and arrival delays as well as filed versus actually flown tracks) aid in the analysis.

Traffic Management Advisor Display (Free Flight Phase 1) (TMA Display (FFP1))

The Traffic Management Advisor Display (Free Flight Phase 1) (TMA Display (FFP1)) is located at the Traffic Management Unit (TMU) and displays two views: The Timeline Graphical User Interface (TGUI) (TMA timeline data), and the Plan Graphical User Interface (PGUI) (Plan View Display).

Separate from the TMA Display in the TMU, TMA meter list data is passed from the TMA workstation to Host for display on the Display System Replacement (DSR) console.

Weather and Radar Processor (key system)

The Weather and Radar Processor (WARP) system provides the capability to simultaneously and continuously receive, process, generate, store, and display aviation-related weather information and radar products from external sources and to disseminate this information to other NAS subsystems. The primary purpose of the WARP system is to improve the timeliness and quality of weather information provided to ATC and TFM specialists at the ARTCC and ATCSCC in order to support the tactical and strategic decision-making process.

People

ARTCC Operational Manager In-charge

The ARTCC Operational Manager In-charge (AOMI) provides overall operational supervision to the Area Supervisors assigned to the shift. The AOMI, briefed by the TMU Supervisor on projected traffic for the shift, maintains situational awareness of traffic activities to ensure adequate staffing and optimal operational efficiency for the shift. The AOMI also logs equipment outages and assesses the impact on air traffic. He/she makes the decision to switch from the Host computer to DARC when necessary. The AOMI is also responsible for investigating immediate alerts for possible operational error or operational deviation, keeps immediate alert log up to date, records the outcome of each alert, and notifies Region and/or Headquarters of any occurrences that may become newsworthy. In addition, the AOMI signs for NOTAMS and ALNOTS and ensures proper dissemination.

Airline Operations Center Dispatcher

The Airline Operations Center Dispatcher (AOC Dispatcher) is a major airline employee that enters bulk flight plan requests and works with FAA by revising schedules and providing flight cancellations based on FAA provided data (aggregate demand lists, arrival rates, and parameters for anticipated ground delays.)

Flight Data / Notice to Airmen / Coordinator

A Flight Data / Notice to Airmen / Coordinator performs the following activities: Compile, evaluate, record, and disseminate NOTAMs and flight movement data (Visual Flight Rules (VFR), Instrument Flight Rules (IFR), Civil, Military and International flight plans; flight notification messages, customs notifications, law enforcement notifications); Initiate search and rescue.

Meteorologist

Meteorologists provide accurate and timely weather information for FAA facilities within their area of responsibility. They analyze and interpret real-time weather data from radar, satellites and pilot reports as well as NWS products such as terminal and area forecasts, and in-flight advisories.

National Operations Manager

The National Operations Manager oversees monitoring weather reports and radar to determine when severe storm activity is approaching a facility. Each National Operations Manager is under the general supervision of the assistant division manager.

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Traffic Management Coordinators

Traffic Management Coordinators track and predict traffic flows, analyze ground delays, evaluate alternative routing strategies, and plan local traffic patterns at the local facility (ARTCC, TRACON, or Towers)

Traffic Management Specialist

Traffic Management Specialists perform the following activities: Balance air traffic demand with the airspace's capacity to maintain maximum and efficient utilization of the NAS; Coordinate and implement traffic management directives if needed for area of responsibility; Monitor and balance traffic flows within the area of responsibility in accordance with traffic management directives; Evaluate effectiveness of traffic management directives and make necessary adjustments; Document delay information.

Interfaces

Enhanced Traffic Management System — (Flight Data) → Collaborative Decision Making Workstation
Enhanced Traffic Management System ← (Flight Data) → Enhanced Traffic Management System
Enhanced Traffic Management System ← (Track Data) → Enhanced Traffic Management System
Enhanced Traffic Management System ← (Weather Data) → Enhanced Traffic Management System
Enhanced Traffic Management System — (Flight Data) → Post Operations Evaluation Tool
Flight Schedule Monitor — (NAS Status Data) → Enhanced Traffic Management System
Weather and Radar Processor — (Weather Data) → Enhanced Traffic Management System
Weather and Radar Processor — (Weather Data) → Weather and Radar Processor

Each ARTCC Weather and Radar Processor (WARP) constructs and sends its regional radar mosaics to the ATCSCC WARP. These regional mosaics are used at the ATCSCC to create and generate the national radar mosaic product. The national mosaics are then distributed from the ATCSCC, out to all WARP sites.

Issues

none identified

Service Group Air Traffic Services
Service TM-Strategic Flow
Capability Flight Day Management
Operational Improvement

Enhance Collaborative Decision Making (105205)

A more robust interactive decision support toolset increases NAS user and traffic manager flexibility to manage flight operations by interfacing with the multiple systems that provide current constraints. These include special use airspace, equipment and facility status, and weather conditions. Traffic management and airlines improve in negotiating planned equipment outages.

31-Dec-2007 to 31-Dec-2015

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Traffic Flow Management (TFM) decision support functions support increased use of Collaborative Decision Making (CDM). Collaboration is the cornerstone of information exchange including demand, capacity, system constraints, and resource management. Fundamental to the management concept is the premise that effective service is provided on the basis of user or service provider priorities through shared information and decision-making. The ability of users and service providers to plan, coordinate, and reach agreements is managed in a short period of time. Users assume the responsibility for adhering to individual TFM agreements.

Traffic Flow Management System - Modernization (TFM-M) and its tool suite provide an integrated view of several functionalities. TFM-M and the Unified Decision Management System (UDMS) provide functionality for the Collaborative Routing Coordination Tool (CRCT), CDM, flight plan pre-processor (FPPP), flight schedule monitor, National Log, and What-If tools. CRCT provides improved management of sector congestion and the effects of severe convective weather. The CRCT functionality also provides an evaluation tool for airspace redesign and procedural and operational analysis. FPPP provides the latest flight information for planning. The National Log and What-If tools provided a common display, ensuring information is available between en route, arrival, and departure facilities on the Integrated Information Workstation (IIW), and user remote systems to support collaboration. This common data is accessed via the System Wide Information Management (SWIM) system.

Equipment status and outages that can adversely impact capacity are monitored and reported by the maintenance management system. Traffic flow in the NAS is managed through CDM by the Airway Facilities Specialists, Traffic Management Specialists, and other users who evaluate NAS status information and air traffic information to determine and mitigate airspace and airport capacity constraints.

This NAS status information is based on TFM-M planning and results, which use data available on SWIM including flight data from the FPPP and equipment status and resource data from the Aeronautical Information Management (AIM) system. The TFM-M then tracks and predicts traffic flows, analyzes the effects of ground delays or weather delays, analyzes the effects of equipment outages, evaluates alternative routing strategies, and plans traffic flow patterns. The result of these analyses is then shared via SWIM with all stakeholders who use the analyzed data to make informed collaborative decisions on maintenance schedules that will minimizes the impacts on traffic flows and flight operations in the NAS. This is accomplished by effective resource reallocation including personnel and systems. CDM results are stored in UDMS for future assessment and performance management.

Benefits

Collaboration optimizes individual business cases. Improved decision support systems provide users and service providers common situation awareness and a visual displays of resources and demand to manage more complex traffic flows.

Systems

Aeronautical Information Management (key system)

The AIM system represents the evolution of the acquisition, storage, processing and dissemination of aeronautical information in the NAS. Aeronautical information is defined as any information concerning the establishment, condition, or change in any component (facility, service, or procedure of, of hazard) of the National Airspace System. Aeronautical information comes in two types a somewhat static type, and a more dynamic type. The static portion represents the aeronautical information baseline as a particular date, while the dynamic portion updates particular aspects of the static portion due to system impacts or events. The Static portion represents data that NAS automation systems and other users use to adapt their software to properly operate. The dynamic portion represents information typically contained in NOTAMs that indicate short-term changes to the static data.

Many NAS systems support the acquisition, generation, and dissemination of the static aeronautical information. Information of this type includes airspace structures, airways, locations of NAS facilities, inter-facility letters of agreement and memorandums of understanding, obstructions, standard procedures, airspace charts, etc.

Several NAS systems also support the acquisition, generation, processing, and dissemination of the dynamic aeronautical information. Information of this type includes, facility outages, runway closures, temporary flight restrictions, airspace constraints, SIGMETs, etc. This information must be disseminated to users and providers of air traffic services in a timely and efficient manner.

AIM will provide the central point for the dissemination of high quality, configuration controlled information to NAS systems, service providers and users of the NAS. AIM will disseminate data based on the Aeronautical Information Exchange Model (AIXM) protocols.

Collaborative Routing and Coordination Tool (key system)

The Collaborative Routing and Coordination Tool (CRCT) consists of the hardware and software required to designate areas of severe weather or congestion as Flow Constrained Areas (FCA), identify flights predicted to enter the FCA, and assess the impact of rerouting flights identified on the en route traffic control center sector loading.

Flight Data Management - Air Traffic Control System Command Center

The Flight Data Management for Air Traffic Control System Command Center (FDM -ATCSCC) provides the national control center portion of a fully distributed flight data processing capability, using the initial flight object, which includes existing flight plan information and trajectory and performance data (preferred routes, runways). Provides data management and data distribution within the ATCSCC facility.

Flight Plan Pre-Processor

The FPPP will permit airlines to submit trial plans for evaluation up to 24 hours in advance, as well as providing early intent FPs to improve the predictive accuracy of ETMS traffic flow models by providing more accurate routing data to ETMS earlier in the planning process. FPPP will also simulate a capability to accept flight plans to be filed, which will be forwarded to the respective NAS Host. This capability will permit the filing of flight plans to a single destination, instead of to the 20 NAS Host systems. FPPP is being developed as a significant step in a multi-phased approach aimed at providing airlines with analytical tools to support flight plan preprocessing.

Flight Schedule Monitor Enhancements

Flight Schedule Monitor Enhanced (FSM Enhanced) augments the existing FSM system by incorporating distance-based Ground Delay Programs (GDP), multiple-fix GDPs, airport GDPs, and playbook-based GDPs. Playbook refers to the National Playbook, which is a collection of Severe Weather Avoidance Plan (SWAP) routes that are pre-validated and coordinated with impacted Air Route Traffic Control Centers (ARTCCs). It is designed to mitigate the potential adverse impact to users and the FAA during periods of severe weather or other events that affect the NAS.

Integrated Information Workstation - Build 1

IIW Build 1 will include the infrastructure and system interfaces to acquire, analyze, store, update, display, and manage the following information in an integrated manner: (1) National Airspace System (NAS) aeronautical, (2) airport environmental, (3) airborne and surface surveillance, (4) flight information, (5) weather information, and (6) NAS status. Build 1 will also replace its predecessor system, FAA Data Display System, as well as interface with the following systems in support of its mission: Flight Object Management, System Wide Information Management, Next Generation- Traffic Flow Management, Maintenance Management System, Unified Decision Management System, and Aeronautical Information Management.

National Airspace System Infrastructure Management System Phase 2 (key system)

National Airspace System Infrastructure Management System (NIMS) Phase 2 will enhance resource and enterprise management, by developing NAS customer and user interaction tools, and providing additional performance and cost trend analysis. The NIMS will provide status information to all NAS users in near real time via the System Wide Information Management (SWIM) system. NIMS Phase 2 will enhance NIMS Phase 1 by providing the tools to achieve the concept of NAS Infrastructure Management (NIM). This new approach to the operation and maintenance of the NAS infrastructure will incorporate a performance-based service management approach that is focused on achieving user and customer satisfaction and managing NAS infrastructure services. The key characteristics of the NIM concept are: 1. Consolidating expertise in control centers to provide rapid, effective response to customer needs, support centralized operational control, and gain efficiencies. 2. Centralized Remote Monitoring and Control of NAS infrastructure services and systems to provide efficient service delivery and systems management. 3. Nationwide Operations Planning to provide standardized field operations across the NAS to facilitate consistent interaction with customers. 4. Information Infrastructure to provide real-time information collection and distribution to provide common NAS performance metrics and cost accounting. 5. Performance Based Management to provide data for the prioritization of maintenance activities and investment decisions.

The NIMS Enterprise Management (EM) will monitor and control NAS subsystems, equipment, resources and the NIMS. An Enterprise Manager Suite, consisting of commercially available hardware and software components, is installed at each of the four Operations Control Centers. The NIMS Resource Manager (RM) will support all NIMS Resource Functions. The NIMS RM, consisting of commercially available hardware and software components, is installed at each of the four Operations Control Centers.

The NIMS Enterprise Manager will be integrated with the NIMS Resource Manager to provide, Automated Incident Ticketing, a Common Logging System, Real Time System Performance Monitoring, and a Centralized Logistics/Maintenance System.

System Wide Information Management Build 1A

SWIM provides for National Airspace System (NAS)-wide transport and sharing of information between the Federal Aviation Administration and users. SWIM is a consistent and single point of entry for users to publish and subscribe to NAS data. SWIM provides context-sensitive information to NAS elements that require the information. SWIM replaces many single-focus networks, such as FIRMNet and CDMnet. This build will integrate Aeronautical, Weather, and NAS Resource Status information systems into the SWIM architecture. A SWIM Management Unit, at each facility, will support the sending (publishing) and receiving (subscribing) of data on SWIM and the SDN. A central SWIM Directory Management Unit will maintain a directory of data available for subscription and publication.

Traffic Flow Management System Applications Upgrade (key system)

Traffic Flow Management System Applications Upgrade (TFM Applications Upgrade) will be an integrated system used by traffic management specialists and coordinators to track and predict traffic flows; analyze effects of ground or weather delays; evaluate alternative routing strategies; improve collaborative decision making among users; plan traffic flow patterns; and assess daily and long term traffic flow performance in the National Airspace System (NAS) to better balance capacity and demand requirements for all users. Using the current Enhanced Traffic Flow Management System (ETMS) functionality as a baseline, this mechanism will evolve to a new open systems software architecture. This new architecture is expected to lower the life cycle cost of software maintenance, the development/integration of existing and future functionality and capabilities, and interface to other domain automation systems. This upgrade will facilitate new functionality and integrate existing TFM standalone subsystems and prototypes such as POET, TM Log, ESIS, DSP, etc. and improve the human computer interface (HCI).

Unified Decision Management System

The Unified Decision Making System (UDMS) enhances the Collaborative Decision Making (CDM) process by enabling NAS users and the FAA to share flight schedules, planned traffic initiatives (e.g., Ground Delay Programs), advanced traffic flow predictions, and other NAS data electronically. UDMS upgrades the basic CDM functionality of the TFM-M system hub that connects to user-owned data networks. NAS users gain access to more sophisticated graphical and textual traffic flow predictions, as well as automated planning and analysis tools.

Support Activities

AF Procedure Development for Enhanced Collaborative Decision Making

Airway Facilities procedures document the way airway facility operations are to be executed. The introduction of new systems, or changes to existing systems results in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

AF Training for Enhanced Collaborative Decision Making

Airway Facilities (AF) training is provided to AF workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AF Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

AT Procedure Development for Enhanced Collaborative Decision Making

Air Traffic Procedures document air traffic services and how they are implemented. The introduction of new systems, or changes to existing systems, may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

AT Training for Enhanced Collaborative Decision Making

Air Traffic (AT) training is provided to the AT workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AT Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

FAA Adaptation for Enhanced Collaborative Decision Making

Many NAS systems incorporate parameters that are adjustable. This allows for the setting of system parameters to optimize performance at each particular site. When new systems that have adjustable parameters are introduced into the NAS, adaptation data must be developed for the system. Environmental and procedural changes may also result in the need to modify FAA Adaptation Data. Generally, adaptation will begin 12 months before IOC and continue until 12 months after IOC.

FAA Airspace Design for Enhanced Collaborative Decision Making

FAA Airspace Design provides the aviation community the description, operational composition, and status of airspace/airport components of the NAS. Generally, airspace design begins six months prior to Initial Operating Capability.

FAA Flight Check for Enhanced Collaborative Decision Making

FAA Flight Check is an activity necessary to certify navigational aids required to deliver NAS services. Flight checks ensure that performance standards are met and are completed up to 90 days before Initial Operating Capability to insure safety.

Non-FAA Pilot Procedure Development for Enhanced Collaborative Decision Making

A number of NAS users document the way their activities are to be carried out. The introduction of new systems, or changes to existing systems may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development will generally begin once ATC procedures have been established and be complete by 90 days prior to Initial Operating Capability, in order to facilitate training.

Non-FAA Pilot Training for Enhanced Collaborative Decision Making

Non-FAA Pilot Training is provided to educate pilots as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional pilot training. Training will generally begin 60 days prior to IOC and be complete within one year following Full Operating Capability.

Non-FAA Procedure Development for Enhanced Collaborative Decision Making

A number of NAS users document the way their activities are to be carried out. The introduction of new systems, or changes to existing systems may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development will generally begin once ATC procedures have been established and be complete by 90 days prior to Initial Operating Capability, in order to facilitate training.

Non-FAA Training for Enhanced Collaborative Decision Making

Non-FAA Training is provided to educate users and their workforces as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional pilot training. Training will generally begin 60 days prior to IOC and be complete within one year following Full Operating Capability.

People

AF Supervisor

An Airway Facilities supervisor may be located in a tower, TRACON, ARTCC or at the Systems Maintenance Office (SMO). The AF supervisor's primary responsibilities are the oversight and deployment of AF personnel and positions to maintain, restore, and certify all the AF systems under his or her responsibility. The AF supervisor is also responsible for overseeing activities at their facility that can impact the NAS such as engineering activities conducted by contractors, FAA personnel, and other government entities.

ARTCC Operational Manager In-charge

The ARTCC Operational Manager In-charge (AOMI) provides overall operational supervision to the Area Supervisors assigned to the shift. The AOMI, briefed by the TMU Supervisor on projected traffic for the shift, maintains situational awareness of traffic activities to ensure adequate staffing and optimal operational efficiency for the shift. The AOMI also logs equipment outages and assesses the impact on air traffic. He/she makes the decision to switch from the Host computer to DARC when necessary. The AOMI is also responsible for investigating immediate alerts for possible operational error or operational deviation, keeps immediate alert log up to date, records the outcome of each alert, and notifies Region and/or Headquarters of any occurrences that may become newsworthy. In addition, the AOMI signs for NOTAMS and ALNOTS and ensures proper dissemination.

Airline Operations Center Dispatcher

The Airline Operations Center Dispatcher (AOC Dispatcher) is a major airline employee that enters bulk flight plan requests and works with FAA by revising schedules and providing flight cancellations based on FAA provided data (aggregate demand lists, arrival rates, and parameters for anticipated ground delays.)

Meteorologist

Meteorologists provide accurate and timely weather information for FAA facilities within their area of responsibility. They analyze and interpret real-time weather data from radar, satellites and pilot reports as well as NWS products such as terminal and area forecasts, and in-flight advisories.

National Operations Manager

The National Operations Manager oversees monitoring weather reports and radar to determine when severe storm activity is approaching a facility. Each National Operations Manager is under the general supervision of the assistant division manager.

Planning Controller

A Planning Controller performs the following activities: Ensure separation; Initiate control instructions; Operate interphones; Conduct air/ground communications via data link; Coordinate tactical traffic flows; Scan flight data; Correlate with situation data; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the tactical controller when aware of those instructions.

Traffic Management Coordinators

Traffic Management Coordinators track and predict traffic flows, analyze ground delays, evaluate alternative routing strategies, and plan local traffic patterns at the local facility (ARTCC, TRACON, or Towers)

Traffic Management Specialist

Traffic Management Specialists perform the following activities: Balance air traffic demand with the airspace's capacity to maintain maximum and efficient utilization of the NAS; Coordinate and implement traffic management directives if needed for area of responsibility; Monitor and balance traffic flows within the area of responsibility in accordance with traffic management directives; Evaluate effectiveness of traffic management directives and make necessary adjustments; Document delay information.

Interfaces

National Airspace System Infrastructure Management System Phase 2 ← (NAS Status Data) → National Airspace System Infrastructure Management System Phase 2

The NIMS master systems interfaces with the NIMS client systems to share files, monitor messages and allow communications between maintenance data terminals anywhere within the NIMS network.

Issues

none identified

Service Group Air Traffic Services

Service TM-Strategic Flow

Capability Flight Day Management

Operational Improvement

Provide Full Collaborative Decision Making (105207)

An interactive decision support toolset increases NAS user and traffic manager flexibility to manage flight operations. All users and traffic managers improve in exchanging information and negotiating flight plan changes. Collaborative routing enhancements improve aircraft operators' ability to flight-plan based on airspace availability and traffic managers' ability to plan responses to demand. There are slot allocation, routes, and mitigation strategies for congestion and weather, and tactical negotiation solutions of user requests are provided and their results distributed to the collaborative planning toolset.
31-Jan-2016 to 01-Jan-2019

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Collaborative Decision Making (CDM) is a continuous process of refinements and improvements to the National Airspace System (NAS) air traffic management services to improve traffic flow through increased information exchange and collaboration between the FAA and the aviation community. The practice of CDM is achieved utilizing the three basic principles of common situational awareness, distributed planning, and performance analysis.

Common situational awareness is achieved by exchanging all NAS data contained in the Aeronautical Information Management (AIM) system, user flight object information contained in the Flight Object Management System (FOMS), and equipment status data from the maintenance monitoring system via the System Wide Information Management(SWIM) system to all service providers and users as required. Common situational awareness for collaboration uses the Internet as the communications medium for online data conferencing. Next Generation - Traffic Flow Management (NG-TFM) integrates some system-to-system coordination through increased automation, provides access to AIM information, allows increased Unified Decision Management System (UDMS) collaboration, provides increased data integrity, and allows for performance analysis. Contingency responses to security threats are developed and managed through increased use of system-to-system coordination. The exchange of real-time information between the Air Traffic Control System Command Center (ATCSCC) and all users enables each party to be aware of system demand and constraints for better decision-making. Distributed planning is enabled by common situational awareness of NAS resource status, capacity constraints, impacting weather conditions, and operational status. Distributed planning is the process by which NAS users can provide input into air traffic management decisions to ensure that limited resources are used in a manner that accommodate individual cases. Performance analysis involves the strategic assessment of expected NAS performance and post analysis of implemented CDM traffic management initiatives. Planning and execution of strategic flow initiatives is automated via UDMS with automatic exchange of results.

The NG-TFM platform provides monitor alert and congestion prediction functions to help initiate CDM activities. Analysis of implemented CDM traffic management initiatives involves measuring the benefits of initiatives so that system performance can be improved where possible. Post analysis of the near past is performed by the ATCSCC using NG-TFMs fully integrated set of applications including: a flight schedule analyzer to measure performance outcomes such as proposed arrival times compared to actual arrival times. This provides an online evaluation and feedback process so that adjustments to plans can be made in near real-time to minimize the impacts of constraints. Analysis is also performed on reroutes using the evaluation tools to compute factors such as fuel burns and time in route. NG-TFM uses the flow evaluation areas and flow constrained functions displayed on the standard automation platform (SAP) to designate airspace as a Flow Constrained Area (FCA) and identify all flights predicted to enter the FCA. Users access and discuss public FCAs through the use of the Common Constraint Situation Display a Web-based application to NG-TFM.

NG-TFM will process Flight Object Management System (FOMS) information and UDMS strategies to develop and distribute daily planning. Managing NAS resources will become more dynamic and adaptive. Strategic flow initiatives allow full realignment of NAS resources to best meet the projected traffic situation. Initial system-to-system automation provides for the development of alternative airspace configurations, simulating traffic through the NAS for airspace proposals, and evaluating each request with respect to its impact on NAS resources.

The General Weather Processor (GWP) presents climatological information and develops forecasts. New weather products seek to reduce traffic flow disruptions by creating accurate and reliable convective forecasts for strategic use through collaboration. The forecast is generated six times a day for forecast windows of two, four, and six hours.

Special Planning Telcons are replaced with continuous collaboration and documented decisions maintained in the UDMS, which are reviewed for performance quality dynamically using system-to-system coordination. The CDM Conference Control System facilitates these strategic planning operations.

Initial system-to-system coordination of the flight profile with FOMS provides best business case opportunities to meet users needs. NAS users have the flexibility to use resource allocations in a manner that best meet their operational needs. If the collaboration determines that a capacity constraining initiative is no longer needed, the UDMS is updated and regulatory action purged by the NG-TFM.

The ATCSCC is tasked with monitoring compliance with both the strategic and tactical restrictions in place in the NAS.

Benefits

Productivity is increased through effective resource allocation. Improved predictability, efficient use of resources, increased opportunity for access, and flexibility to assign underutilized assets is enhanced by the documentation of CDM decisions. Predictability of available resources will improve access and increase capacity.

Systems

Aeronautical Information Management (key system)

The AIM system represents the evolution of the acquisition, storage, processing and dissemination of aeronautical information in the NAS. Aeronautical information is defined as any information concerning the establishment, condition, or change in any component (facility, service, or procedure of, of hazard) of the National Airspace System. Aeronautical information comes in two types a somewhat static type, and a more dynamic type. The static portion represents the aeronautical information baseline as a particular date, while the dynamic portion updates particular aspects of the static portion due to system impacts or events. The Static portion represents data that NAS automation systems and other users use to adapt their software to properly operate. The dynamic portion represents information typically contained in NOTAMs that indicate short-term changes to the static data.

Many NAS systems support the acquisition, generation, and dissemination of the static aeronautical information. Information of this type includes airspace structures, airways, locations of NAS facilities, inter-facility letters of agreement and memorandums of understanding, obstructions, standard procedures, airspace charts, etc.

Several NAS systems also support the acquisition, generation, processing, and dissemination of the dynamic aeronautical information. Information of this type includes, facility outages, runway closures, temporary flight restrictions, airspace constraints, SIGMETs, etc. This information must be disseminated to users and providers of air traffic services in a timely and efficient manner.

AIM will provide the central point for the dissemination of high quality, configuration controlled information to NAS systems, service providers and users of the NAS. AIM will disseminate data based on the Aeronautical Information Exchange Model (AIXM) protocols.

Flight Data Management - Air Traffic Control System Command Center

The Flight Data Management for Air Traffic Control System Command Center (FDM -ATCSCC) provides the national control center portion of a fully distributed flight data processing capability, using the initial flight object, which includes existing flight plan information and trajectory and performance data (preferred routes, runways). Provides data management and data distribution within the ATCSCC facility.

Flight Object Management System - Terminal (key system)

The FOMS is a component of the Standard Automation Platform (SAP). The FOMS processes flight data received from multiple sources via the System Wide Information Management (SWIM) Management Unit. The FOMS also receives track data from the Surveillance Data Processor (SDP) and associates tracks with flight data, producing the flight object, which is published to SWIM for subscriber use. Flight plan support functionality includes end-to-end profile evaluation in all phases of flight and evaluation against static and dynamic constraints (terrain, obstacles, airspace restrictions, etc.). The FOMS supports flight planning up to 180 days prior to day of flight. A user can access the flight object from initial to closeout in the same manner. The FOMS provides end-to-end flight data management from preflight to post analysis. Ownership of the flight object begins and ends with Traffic Flow Management and transitions during the flight to clearance delivery, ramp, surface, departure, transition to cruise, cruise, transition to arrival, and ramp. Flight data management is based on trajectory, assigned volumes, and "necessary" route structure.

General Weather Processor (key system)

The GWP collects, analyzes, tailors, displays, and distributes weather products. The GWP receives weather data from multiple sensors and distributes processed and tailored weather information via System Wide Information Management. The GWP provides a standard set of algorithms and access to data/products that convey current and future status of impacting weather to all National Airspace System services.

Integrated Information Workstation - Build 1 (key system)

IIW Build 1 will include the infrastructure and system interfaces to acquire, analyze, store, update, display, and manage the following information in an integrated manner: (1) National Airspace System (NAS) aeronautical, (2) airport environmental, (3) airborne and surface surveillance, (4) flight information, (5) weather information, and (6) NAS status. Build 1 will also replace its predecessor system, FAA Data Display System, as well as interface with the following systems in support of its mission: Flight Object Management, System Wide Information Management, Next Generation- Traffic Flow Management, Maintenance Management System, Unified Decision Management System, and Aeronautical Information Management.

National Airspace System Infrastructure Management System Phase 3

National Airspace System Infrastructure Management System (NIMS) Phase 3 will enhance Phase 2 enterprise and resource management, by further developing NAS customer and user interaction tools, and provide additional performance and cost trend analysis.

The NIMS Enterprise Management (EM) will monitor and control NAS subsystems, equipment and resources. The NIMS will provide status information to all NAS users in near real time via the System Wide Information Management (SWIM) system. An Enterprise Manager Suite, consisting of commercially available hardware and software components, is installed at each of the four Operations Control Centers. The NIMS Resource Manager (RM) will support all NIMS Resource Functions. The NIMS RM, consisting of commercially available hardware and software components, is installed at each of the four Operations Control Centers.

The NIMS Enterprise Manager will be integrated with the NIMS Resource Manager to provide, Automated Incident Ticketing, a Common Logging System, Real Time System Performance Monitoring, and a Centralized Logistics/Maintenance System.

Next Generation Traffic Flow Management (key system)

The Next Generation Traffic Flow Management (NG-TFM) system provides an array of automation and data processing tools for Traffic Management Specialists (TMS) and Traffic Management Coordinators (TMC), as well as a gateway that enables NAS users to make changes in flight schedules based on planned traffic initiatives (e.g., Ground Delay Programs) and other NAS data. This enhanced decision support system provides increased information exchange between FAA service providers and NAS users. NG-TFM receives flight schedules from NAS users (e.g., air carriers) and combines these with weather data, NAS status data, and planned traffic initiatives to generate detailed graphical and textual traffic displays as far as 24 hours into the future on both national and local scales. Features include both pre-flight and post-flight analysis tools, flight data archiving, enhanced traffic displays, traffic strategy (one or more initiatives) automation, "what if" strategy analysis, and automated TFM training tools.

NG-TFM is comprised of five different software component systems and will include a hardware and operating system software tech refresh. The complete NG-TFM software package includes changes to support interfaces with the Flight Object Management System (FOMS) and System Wide Information Management (SWIM). When complete, this will establish a new NG-TFM system baseline.

Standard Automation Platform Convergence Phase 1 (key system)

The purpose of Standard Automation Platform Convergence Phase 1 (SAP Conv P1) is to reduce both procurement and recurring costs by standardizing and sharing as many hardware and software ATC Automation components as possible.

An engineering convergence task will begin in fiscal year 2005 and run through 2015. All components from each of the automation systems (STARS, ERAM, TFM, etc.) will be analyzed, and the "best of breed" and "core" components will be selected. SAP convergence will be performed in the following areas: (1) Hardware; (2) System Software (operating systems, Commercial-Off-The-Shelf tools, etc.); (3) ATC applications that can be shared across domains; (4) ATC applications that are unique to a domain; and (5) ATC system support tools that can be shared across domains (adaptation, data extraction or systems analysis recording, data reduction and analysis tools, etc.). Proven STARS and ERAM components will be slected, integrated into the SAP, and rigorously tested for replacing STARS and ERAM components at or near their end of service life.

Prototyping begun under Phase 1 will continue with SAP Conv P2. The results of both efforts will lead to refining the requirements to develop the SAP WS mechanism with SDP and FOMS applications.

System Wide Information Management Build 1B (key system)

Build 1B provides all items in 1A, including more NAS information. This build integrates Flight and Surveillance Information systems into the SWIM architecture.

Unified Decision Management System (key system)

The Unified Decision Making System (UDMS) enhances the Collaborative Decision Making (CDM) process by enabling NAS users and the FAA to share flight schedules, planned traffic initiatives (e.g., Ground Delay Programs), advanced traffic flow predictions, and other NAS data electronically. UDMS upgrades the basic CDM functionality of the TFM-M system hub that connects to user-owned data networks. NAS users gain access to more sophisticated graphical and textual traffic flow predictions, as well as automated planning and analysis tools.

Support Activities

AF Procedure Development for Full Collaborative Decision Making

Airway Facilities procedures document the way airway facility operations are to be executed. The introduction of new systems, or changes to existing systems results in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

AF Training for Full Collaborative Decision Making

Airway Facilities (AF) training is provided to AF workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AF Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

AT Procedure Development for Full Collaborative Decision Making

Air Traffic Procedures document air traffic services and how they are implemented. The introduction of new systems, or changes to existing systems, may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

AT Training for Full Collaborative Decision Making

Air Traffic (AT) training is provided to the AT workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AT Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

FAA Adaptation for Full Collaborative Decision Making

Many NAS systems incorporate parameters that are adjustable. This allows for the setting of system parameters to optimize performance at each particular site. When new systems that have adjustable parameters are introduced into the NAS, adaptation data must be developed for the system. Environmental and procedural changes may also result in the need to modify FAA Adaptation Data. Generally, adaptation will begin 12 months before IOC and continue until 12 months after IOC.

FAA Airspace Design for Full Collaborative Decision Making

FAA Airspace Design provides the aviation community the description, operational composition, and status of airspace/airport components of the NAS. Generally, airspace design begins six months prior to Initial Operating Capability.

FAA Flight Check for Full Collaborative Decision Making

FAA Flight Check is an activity necessary to certify navigational aids required to deliver NAS services. Flight checks ensure that performance standards are met and are completed up to 90 days before Initial Operating Capability to insure safety.

FAA Standards for Full Collaborative Decision Making

FAA standards development is an activity necessary to support people and systems in the delivery of NAS services. FAA Standards establish rules for the measure of quantity, weight, extent, value, or quality.

Non-FAA Pilot Procedure Development for Full Collaborative Decision Making

A number of NAS users document the way their activities are to be carried out. The introduction of new systems, or changes to existing systems may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development will generally begin once ATC procedures have been established and be complete by 90 days prior to Initial Operating Capability, in order to facilitate training.

Non-FAA Pilot Training for Full Collaborative Decision Making

Non-FAA Pilot Training is provided to educate pilots as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional pilot training. Training will generally begin 60 days prior to IOC and be complete within one year following Full Operating Capability.

Non-FAA Procedure Development for Full Collaborative Decision Making

A number of NAS users document the way their activities are to be carried out. The introduction of new systems, or changes to existing systems may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development will generally begin once ATC procedures have been established and be complete by 90 days prior to Initial Operating Capability, in order to facilitate training.

Non-FAA Training for Full Collaborative Decision Making

Non-FAA Training is provided to educate users and their workforces as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional pilot training. Training will generally begin 60 days prior to IOC and be complete within one year following Full Operating Capability.

People

AF Facilities Specialist

AF Facilities Specialist maintain facility systems such as HVAC and power for their area of responsibility. Their duties include troubleshooting failures, performing corrective maintenance, certifying systems are operational, and performing preventive maintenance.

AF Supervisor

An Airway Facilities supervisor may be located in a tower, TRACON, ARTCC or at the Systems Maintenance Office (SMO). The AF supervisor's primary responsibilities are the oversight and deployment of AF personnel and positions to maintain, restore, and certify all the AF systems under his or her responsibility. The AF supervisor is also responsible for overseeing activities at their facility that can impact the NAS such as engineering activities conducted by contractors, FAA personnel, and other government entities.

ARTCC Operational Manager In-charge

The ARTCC Operational Manager In-charge (AOMI) provides overall operational supervision to the Area Supervisors assigned to the shift. The AOMI, briefed by the TMU Supervisor on projected traffic for the shift, maintains situational awareness of traffic activities to ensure adequate staffing and optimal operational efficiency for the shift. The AOMI also logs equipment outages and assesses the impact on air traffic. He/she makes the decision to switch from the Host computer to DARC when necessary. The AOMI is also responsible for investigating immediate alerts for possible operational error or operational deviation, keeps immediate alert log up to date, records the outcome of each alert, and notifies Region and/or Headquarters of any occurrences that may become newsworthy. In addition, the AOMI signs for NOTAMS and ALNOTS and ensures proper dissemination.

Airline Operations Center Dispatcher

The Airline Operations Center Dispatcher (AOC Dispatcher) is a major airline employee that enters bulk flight plan requests and works with FAA by revising schedules and providing flight cancellations based on FAA provided data (aggregate demand lists, arrival rates, and parameters for anticipated ground delays.)

Flight Data / Notice to Airmen / Coordinator

A Flight Data / Notice to Airmen / Coordinator performs the following activities: Compile, evaluate, record, and disseminate NOTAMs and flight movement data (Visual Flight Rules (VFR), Instrument Flight Rules (IFR), Civil, Military and International flight plans; flight notification messages, customs notifications, law enforcement notifications); Initiate search and rescue.

Meteorologist

Meteorologists provide accurate and timely weather information for FAA facilities within their area of responsibility. They analyze and interpret real-time weather data from radar, satellites and pilot reports as well as NWS products such as terminal and area forecasts, and in-flight advisories.

National Operations Manager

The National Operations Manager oversees monitoring weather reports and radar to determine when severe storm activity is approaching a facility. Each National Operations Manager is under the general supervision of the assistant division manager.

Planning Controller

A Planning Controller performs the following activities: Ensure separation; Initiate control instructions; Operate interphones; Conduct air/ground communications via data link; Coordinate tactical traffic flows; Scan flight data; Correlate with situation data; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the tactical controller when aware of those instructions.

Rescue Coordination Center Specialist

Rescue Coordination Center People consist of personnel from the United States Coast Guard and the United States Air Force who receive information about overdue or missing aircraft from the FAA and coordinate the search and rescue activities within their respective regions.

Tactical Controller

A Tactical Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios and data link; Oversee data link communications by the associate tactical controller; Accept and initiate automated handoffs; Assist the planning controller with non-automated handoff actions when needed; Assist the planning controller in coordination when needed; Scan the situation display; Correlate with flight data; Ensure computer entries are completed on instructions or clearances you issue or receive.

Traffic Management Coordinators

Traffic Management Coordinators track and predict traffic flows, analyze ground delays, evaluate alternative routing strategies, and plan local traffic patterns at the local facility (ARTCC, TRACON, or Towers)

Traffic Management Specialist

Traffic Management Specialists perform the following activities: Balance air traffic demand with the airspace's capacity to maintain maximum and efficient utilization of the NAS; Coordinate and implement traffic management directives if needed for area of responsibility; Monitor and balance traffic flows within the area of responsibility in accordance with traffic management directives; Evaluate effectiveness of traffic management directives and make necessary adjustments; Document delay information.

Interfaces

Aeronautical Information Management — (Data Communication) → Integrated Information Workstation - Build 1

AIM sends NOTAMS and other data to the IIW for display.

Aeronautical Information Management ← (NAS Status Data) → System Wide Information Management Build 1B

"AIM exchanges NAS Status data, including equipment status, airspace schedules and status, contingency routings, and RNP-RNAV routings, with other systems via SWIM.

Aeronautical Information Management — (Weather Data) → System Wide Information Management Build 1B

AIM provides PIREPS for distribution to NAS users via SWIM.

Flight Object Management System - Terminal ← (Data Communication) → Integrated Information Workstation - Build 1

FOMS sends traffic management decision support tool information to IIW. IIW serves as the controller interface to the tools.

Flight Object Management System - Terminal ← (Flight Data) → Next Generation Traffic Flow Management

FOMS and NG-TFM exchange flight data.

General Weather Processor — (Weather Data) → System Wide Information Management Build 1B

GWP provides weather data to SWIM for distribution to users.

Next Generation Traffic Flow Management — (Data Communication) → Integrated Information Workstation - Build 1

NG-TFM provides traffic flow management data to the IIW for display to controllers.

Next Generation Traffic Flow Management ← (Data Communication) → System Wide Information Management Build 1B

NG-TFM exchanges strategic flow data via SWIM.

System Wide Information Management Build 1B — (NAS Status Data) → Flight Object Management System - Terminal

FOMS receives NAS status data via SWIM.

System Wide Information Management Build 1B — (Weather Data) → Flight Object Management System - Terminal

FOMS receives weather products from GWP and other sources via SWIM.

System Wide Information Management Build 1B — (Flight Data) → Next Generation Traffic Flow Management

NG-TFM receives flight object data via SWIM.

System Wide Information Management Build 1B — (NAS Status Data) → Next Generation Traffic Flow Management

"NG-TFM receives NAS status data, including airspace changes and oceanic constraints, via SWIM.

System Wide Information Management Build 1B — (Weather Data) → Next Generation Traffic Flow Management

NG-TFM receives weather advisory data via SWIM.

System Wide Information Management Build 1B ← (Data Communication) → Unified Decision Management System

UDMS exchanges collaborative decision data via SWIM.

System Wide Information Management Build 1B — (Flight Data) → Unified Decision Management System

UDMS receives flight data via SWIM.

System Wide Information Management Build 1B — (NAS Status Data) → Unified Decision Management System

UDMS receives system status data via SWIM.

System Wide Information Management Build 1B — (Weather Data) → Unified Decision Management System

UDMS receives weather advisory data via SWIM.

Issues

none identified

Service Group Air Traffic Services

Service TM-Strategic Flow

Capability Long Term Planning

Operational Improvement

Current Long Term Planning (105101)

Establishing standard responses, such as playbooks to enable more efficient day of operations. Inputs include capacity and demand models based on airport use data, airspace for special use schedules, airline flight schedules, infrastructure status, and historical flight traffic demand information.

01-Jan-1994 to 31-Dec-2010

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Long-term planning is necessary to match air traffic system capacity with user demand. There are various changes that occur in the National Airspace System (NAS) and in the airline industry that place increased demand on system capacity. The duration of these changes can be one day, several days, several weeks, or until further notice. These changes are often known months or even years in advance of the occurrence. This timeframe allows strategic planning to minimize adverse impacts to users. Long-term planning should take a systemic view of sectors, NAS assets, and workload, because lack of automation to collect, analyze, and evaluate is not available today.

Airline schedule changes occur frequently. These changes are generally market driven and are not necessarily known to the FAA far in advance. The FAA asks for, and is generally given, advance notice of large-scale changes to airline schedules. An example of this is the bi-annual change to and from Daylight Savings Time.

Special procedures may be established for a location to accommodate abnormally large traffic demands (e.g., Indianapolis 500 Race, Kentucky Derby, Experimental Aircraft Association fly-ins) or a significant reduction in airport capacity for an extended period (e.g., due to airport runway or taxiway closures for airport construction). These special procedures, called Special Traffic Management Programs, may remain in effect until the event is over or local traffic management procedures are implemented that can handle the situation.

The Air Traffic Control Systems Command Center (ATCSCC), Airline Operations Centers (AOC), and field facilities constantly evaluate the possible impact to the NAS during the above occurrences. The Central Altitude Reservation Facility (CARF), located at the ATCSCC, is coordinated with to determine what military routings are involved with the impacted airspace. When necessary, the planned changes are modeled against various remedies to mitigate the impacts of the change.

Various modeling tools are available to the FAA and the AOCs to analyze the effect of changes that are planned in the NAS. Some of these tools are automated and others are manual. Host Computer System (HCS) and Enhanced Traffic Management System (ETMS) recorded data provide the inputs for modeling. The result of these modeling efforts can forecast the capacity requirements resulting from planned changes. The following procedures are modeled for effectiveness:

Airport-specific programs designed to deliver a certain hourly amount of arrival aircraft to an airport. Miles-In-Trail restrictions models are accomplished for specific airports, airways, facilities, or sectors. Coded Departure Routes (CDR) or alternate routings, which allow aircraft to maneuver around impacted airspace or accommodate sector-loading efforts, are also modeled.

The FAA and the affected stakeholders use a Collaborative Decision Making (CDM) process once modeling efforts have been accomplished and analyzed. The FAA has responsibility for managing the NAS; however, the CDM process almost always results in consensus among stakeholders about proposed resolutions.

Very large special events are modeled and coordinated with multiple inter- and intra- governmental stakeholders. The Olympics are an example of this type event. All organizations within the FAA are represented in the planning efforts. Additionally, U. S. Customs, the FBI, and the Secret Service are involved, as well as local police and governments.

Benefits

Current operations are provided in the NAS.

Systems

Enhanced Traffic Management System (key system)

The Enhanced Traffic Management System (ETMS) application is at the heart of the Traffic Flow Management (TFM) system, and through it flows the network of all TFM interfaces. ETMS at the Command Center deals with the strategic flow of air traffic at the national level. ETMS at remote facilities is used for local airspace management within the local facility"s own area of responsibility. To facilitate coordination between the Traffic Management Coordinators (TMC) at remote Traffic Management Units (TMUs) and the Traffic Management Specialists (TMS) at the Air Traffic Control System Command Center (ARTSCC), each local ETMS may can also view the national composite picture of traffic for which the Command Center has responsibility. ETMS enables TMS and TMC personnel to track and predict traffic flows, analyze effects of ground delays or weather delays, evaluate alternative routing strategies, and plan traffic flow patterns.

The ETMS central hub is located at the Volpe National Transportation System Center. The hub collects flight schedules, and revisions, from NAS users, and collects actual traffic situation updates from local ETMS TMUs, and combines these with planned traffic initiatives (e.g., Ground Delay Programs) to generate an Aggregate Demand List (ADL) that is output to users every five (5) minutes. The ADL contains predicted arrival and departure traffic at individual airports. NAS users, e.g., air carriers, can access the ADL data to plan and revise their flight schedules to work more efficiently with planned traffic initiatives. This interactive process of flight planning gives users more input to TMCs on how traffic initiatives will affect them and is the heart of the Collaborative Decision Making (CDM) process.

Traffic Management Units (TMUs) are located throughout the NAS amd perform local flow control management functions. TMUs exist in all Air Route Traffic Control Centers (ARTCCs), 35 high activity Terminal Radar Approach Control (TRACONs), 8 Air Traffic Control Towers (ATCTs), 3 Center Radar Approach (CERAP) facilities, and the WJHTC. TMU hardware suites are automated workstations that include computer entry/readout devices, network communications, Flight Strip Printer (FSP), and a Traffic Situation Display (TSD).

NAS users are responsible for providing their own connectivity to the ETMS hub. The various connective user networks are collectively referred to as the CDM Network (CDMnet) which provides two-way connectivity to ETMS. Non-FAA users do not have access to all ETMS data and processing tools.

Flight Schedule Monitor

The Flight Schedule Monitor (FSM) is the main tool for the traffic management specialist at the Air Traffic Control System Command Center (ATCSCC) to monitor, model, and implement Ground Delay Program (GDP) operations. FAA and airlines use FSM to monitor demand through receipt of FSM demand pictures of airports updated every 5 minutes. FSM constructs "what if" scenarios for best options (i.e., best parameters) prior to making a GDP decision. Modeling may be used by: (1) the ARTCC TMC to request ATCSCC implementation of a GDP in the event of significant congestion or if a demand/capacity imbalance is projected at an en route fix, route, or sector; (2) the ATCSCC to determine ARTCC start/end times, Airport Arrival Rate (AAR), and other paramters for a particular GDP scenario; and (3) the Airlines to see the effects of cancelling or delaying a specific flights under a GDP.

Reports from the FSM modeling tool for each GDP include: (1) Carrier Statistics showing total minutes of delay for each flight, (2) Airborne Holding Flight Lists of arrival slots, (3) FSM Slot list, (4) Surface Delay histograms, (5) CTA Compliance Alarms for violations of Arrival compliance, (6) CTD Compliance Alarms for violation of Departure compliance, (7) ETEs on significant differences between actual vs ETMS estimated times, and (8) Spurious Flight Alarms triggered upon cancellation of false flights in a substitution stream.

Host Computer System (key system)

The Host Computer System (HCS) receives and processes surveillance reports, and flight plan information. The HCS sends search/beacon target, track and flight data, surveillance and alphanumeric weather information, time data, traffic management advisories and lists to the (Display System Replacement) DSR. The HCS associates surveillance-derived tracking information with flight-planning information. The DSR sends requests for flight data, flight data updates, and track control messages to the HCS. HCS-generated display orders are translated for use within the DSR workstation. While radar data processing is distributed among the terminal and En Route computer resources, the HCS performs virtually all of the flight data processing for its entire geographical area of responsibility. Every tower (ATCT) and terminal radar approach control (TRACON) relies exclusively on its parent HCS for flight data.

The HCS also runs algorithms that perform aircraft to aircraft (conflict alert) and aircraft to terrain (Minimum Safe Altitude Warning) separation assurance. The HCS algorithms provide visual and audible alerting to the controller when conflicts are identified.

The HCS presently supplies real time surveillance, flight data and other information to several decision support tools housed in collocated outboard processors connected via two-way high bandwidth links to the HCS and DSR. These are the (User Request Evaluation Tool, (URET), and the Traffic Management Advisory (TMA. URET performs probing of tentative flight plan changes to determine their viability. TMA provides sequencing and spacing information to align the aircraft in En Route airspace for approach.

Post Operations Evaluation Tool

Post Operations Evaluation Tool (POET) is an analysis system that allows users of the National Airspace System (NAS), the Air Traffic Control System Command Center (ATCSCC), Air Route Traffic Control Centers (ARTCC), and other FAA facilities to review the functional status of the NAS and help analyze collaborative routing problems in identifying areas of NAS congestion or inefficiency. A variety of performance metrics (e.g., departure, en route, and arrival delays as well as filed versus actually flown tracks) aid in the analysis.

People

Airline Operations Center Dispatcher

The Airline Operations Center Dispatcher (AOC Dispatcher) is a major airline employee that enters bulk flight plan requests and works with FAA by revising schedules and providing flight cancellations based on FAA provided data (aggregate demand lists, arrival rates, and parameters for anticipated ground delays.)

National Operations Manager

The National Operations Manager oversees monitoring weather reports and radar to determine when severe storm activity is approaching a facility. Each National Operations Manager is under the general supervision of the assistant division manager.

Traffic Management Coordinators

Traffic Management Coordinators track and predict traffic flows, analyze ground delays, evaluate alternative routing strategies, and plan local traffic patterns at the local facility (ARTCC, TRACON, or Towers)

Traffic Management Specialist

Traffic Management Specialists perform the following activities: Balance air traffic demand with the airspace's capacity to maintain maximum and efficient utilization of the NAS; Coordinate and implement traffic management directives if needed for area of responsibility; Monitor and balance traffic flows within the area of responsibility in accordance with traffic management directives; Evaluate effectiveness of traffic management directives and make necessary adjustments; Document delay information.

Interfaces

Enhanced Traffic Management System ← (Flight Data) → Enhanced Traffic Management System
Enhanced Traffic Management System ← (Track Data) → Enhanced Traffic Management System
Enhanced Traffic Management System ← (Weather Data) → Enhanced Traffic Management System

Issues

none identified

Service Group Air Traffic Services
Service TM-Strategic Flow
Capability Long Term Planning
Operational Improvement

Enhance Sector Demand Prediction and Resource Planning (105102)

Matching sectors and staffing better to anticipated demand promotes efficiency. This includes proactively adjusting airspace and personnel scheduling to an area based on projections of shift in demand to seasonal changes, as well as city pair business adjustments by airlines.
03-Jan-2011 to 01-Jul-2018

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Long-term planning is necessary to match air traffic system capacity with user demand. Changes occur in the National Airspace System (NAS) as airline industry and other users place increased demand on system capacity. The duration of these stresses can be one day, several days, several weeks, or until further notice. These changes are often known months or even years in advance of the occurrence. This timeframe allows strategic planning to minimize adverse impacts to the users. Long-term planning takes a systemic view of sectors, NAS assets, and workload.

Exemplary of large-scale change is the bi-annual change to and from Daylight Savings Time. Automated tools are used to analyze planned changes in demand on the NAS and provide trend analysis that will allow prudent allocation of NAS resources. These programs use data available via System Wide Information Management (SWIM). The Air Traffic Control Systems Command Center (ATCSCC), Airline Operations Centers (AOC), and air traffic control facilities constantly evaluate the potential impact of these occurrences. When necessary, the planned changes are modeled against mitigation strategies to minimize the impacts. This planning verifies and validates modeling tool requirements.

Modeling traffic management strategic change decisions will require information management from the surface management unit and flight planning information available from the En Route Automation Modernization (ERAM) system. The result of these modeling efforts can forecast the capacity requirements resulting from planned changes. A number of applications or procedures will be modeled to identify trends that will impact the NAS. The following will be modeled for effectiveness: airport specific ground delay programs, system constraints received from Traffic Flow Management - Modernization (TFM-M) coded departure routes assignments, sector loading efforts, severe weather avoidance, and special use airspace assignment to help manage planning and procedure development to support flight day operations.

The FAA and affected stakeholders use a collaborative decision-making process, which reside in the Unified Decision Management System (UDMS) to analyze and mitigate impacts. Modeling will verify the viability of a mitigation strategy against flexible airspace prior to implementation on a NAS-wide basis. This coordination is done with the ATCSCC so adjustments can be made, if required, to overall NAS traffic flow on flight day.

Benefits

Improved predictability, efficient use of resources, increased opportunity for access, and flexibility to assign underutilized assets.

Systems

En Route Automation Modernization

The En Route Automation Modernization System (ERAM System) will replace the existing diverse but functionally unequal primary and backup channels (Host and DARC) with redundant, functionally equivalent primary and backup channels. The new primary and backup channels achieve identical full functionality by using highly reliable fault tolerant processing elements running identical software. A tertiary system with diverse software, and physical and electronic isolation from the ERAM primary and back-up systems, will be maintained as fall back until the functionality, reliability, and availability of ERAM is demonstrated in the field. A training subsystem with functionality identical to the operational system will permit training to be conducted in parallel with operations.

In the past decade, several functions (URET, CTAS, etc.) were implemented as outboard processors/processes to the Host. As ERAM evolves in successive builds, this functionality will be integrated into ERAM as described below.

ERAM''s enhanced FDP will accommodate flexible routing around congestion, weather, and restrictions and improve efficiency by providing improved traffic flows. The enhanced ERAM surveillance processing will accomodate a larger geographic coverage, increased quantity of radar inputs and, when available, integration of Automatic Dependent Surveillance Broadcast data. In addition ERAM will use the improved accuracy and information disseminated by the sensors using the All-purpose Structured EUROCONTROL Radar Information Exchange (ASTERIX) format.

ERAM will allow for improved performance of decision support tools such as the Enhanced Traffic Management System (ETMS). ERAM will also incorporate Center-terminal radar approach control automation system (CTAS) functions (descent advisor, timelines, load graphs, automated miles-in-trail, and the situation display) and multi-center metering using miles-in-trail or time-based scheduling and meter lists.

ERAM will employ an industry standard LAN-based system to improve the efficiency of integrating commercial-off-the-shelf solutions in the future. ERAM software will be developed using a common high-level language to increase the FAA''s access to market-based skills and lower the cost of development and lifecycle maintenance. ERAM''s design will enable future enhancements and maintenance of components without affecting operational availability and increased productivity from an integrated monitor and control capability.

Flight Data Management - Air Traffic Control System Command Center

The Flight Data Management for Air Traffic Control System Command Center (FDM -ATCSCC) provides the national control center portion of a fully distributed flight data processing capability, using the initial flight object, which includes existing flight plan information and trajectory and performance data (preferred routes, runways). Provides data management and data distribution within the ATCSCC facility.

Power Systems

The Power Systems (Pwr Sys) mechanism provides for the conditioning of commercial power, including uninterruptible power systems (UPS), to eliminate voltage dropouts, surges, and voltage sags caused by sources outside the facility. Power distribution, grounding, bonding and shielding of electrical system within the facility is also part of the Pwr Sys.

The Power Systems (Pwr Sys) mechanism provides the following: 1.) ACEPS Busway Replacements, 2.) ACEPS EG Maintenance, 3.) ACEPS Monitoring & Diagnostics, 4.) ACEPS Fuel System Upgrade, 5.) ACEPS Training, 6.) Battery Monitoring, 7.) Training Facility, 8.) CPDS, 9.) Battery Replacements, 10.) DC Systems, 11.) EG, 12.) LPGBS, 13.) Power Cable, 14.) UPS, 15.) Contract Support.

System Wide Information Management Build 1A (key system)

SWIM provides for National Airspace System (NAS)-wide transport and sharing of information between the Federal Aviation Administration and users. SWIM is a consistent and single point of entry for users to publish and subscribe to NAS data. SWIM provides context-sensitive information to NAS elements that require the information. SWIM replaces many single-focus networks, such as FIRMNet and CDMnet. This build will integrate Aeronautical, Weather, and NAS Resource Status information systems into the SWIM architecture. A SWIM Management Unit, at each facility, will support the sending (publishing) and receiving (subscribing) of data on SWIM and the SDN. A central SWIM Directory Management Unit will maintain a directory of data available for subscription and publication.

Traffic Flow Management System Applications Upgrade

Traffic Flow Management System Applications Upgrade (TFM Applications Upgrade) will be an integrated system used by traffic management specialists and coordinators to track and predict traffic flows; analyze effects of ground or weather delays; evaluate alternative routing strategies; improve collaborative decision making among users; plan traffic flow patterns; and assess daily and long term traffic flow performance in the National Airspace System (NAS) to better balance capacity and demand requirements for all users. Using the current Enhanced Traffic Flow Management System (ETMS) functionality as a baseline, this mechanism will evolve to a new open systems software architecture. This new architecture is expected to lower the life cycle cost of software maintenance, the development/integration of existing and future functionality and capabilities, and interface to other domain automation systems. This upgrade will facilitate new functionality and integrate existing TFM standalone subsystems and prototypes such as POET, TM Log, ESIS, DSP, etc. and improve the human computer interface (HCI).

Unified Decision Management System (key system)

The Unified Decision Making System (UDMS) enhances the Collaborative Decision Making (CDM) process by enabling NAS users and the FAA to share flight schedules, planned traffic initiatives (e.g., Ground Delay Programs), advanced traffic flow predictions, and other NAS data electronically. UDMS upgrades the basic CDM functionality of the TFM-M system hub that connects to user-owned data networks. NAS users gain access to more sophisticated graphical and textual traffic flow predictions, as well as automated planning and analysis tools.

Support Activities

AT Procedure Development for Enhanced Sector Demand Prediction and Resource Planning

Air Traffic Procedures document air traffic services and how they are implemented. The introduction of new systems, or changes to existing systems, may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

AT Training for Enhanced Sector Demand Prediction and Resource Planning

Air Traffic (AT) training is provided to the AT workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AT Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

FAA Adaptation for Enhanced Sector Demand Prediction and Resource Planning

Many NAS systems incorporate parameters that are adjustable. This allows for the setting of system parameters to optimize performance at each particular site. When new systems that have adjustable parameters are introduced into the NAS, adaptation data must be developed for the system. Environmental and procedural changes may also result in the need to modify FAA Adaptation Data. Generally, adaptation will begin 12 months before IOC and continue until 12 months after IOC.

FAA Airspace Design for Enhanced Sector Demand Prediction and Resource Planning

FAA Airspace Design provides the aviation community the description, operational composition, and status of airspace/airport components of the NAS. Generally, airspace design begins six months prior to Initial Operating Capability.

Non-FAA Procedure Development for Enhanced Sector Demand Prediction and Resource Planning

A number of NAS users document the way their activities are to be carried out. The introduction of new systems, or changes to existing systems may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development will generally begin once ATC procedures have been established and be complete by 90 days prior to Initial Operating Capability, in order to facilitate training.

Non-FAA Training For Enhanced Sector Demand Prediction and Resource Planning

Non-FAA Training is provided to educate users and their workforces as new systems and/or procedures are introduced.

The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional pilot training. Training will generally begin 60 days prior to IOC and be complete within one year following Full Operating Capability.

People

Airline Operations Center Dispatcher

The Airline Operations Center Dispatcher (AOC Dispatcher) is a major airline employee that enters bulk flight plan requests and works with FAA by revising schedules and providing flight cancellations based on FAA provided data (aggregate demand lists, arrival rates, and parameters for anticipated ground delays.)

Meteorologist

Meteorologists provide accurate and timely weather information for FAA facilities within their area of responsibility. They analyze and interpret real-time weather data from radar, satellites and pilot reports as well as NWS products such as terminal and area forecasts, and in-flight advisories.

National Operations Manager

The National Operations Manager oversees monitoring weather reports and radar to determine when severe storm activity is approaching a facility. Each National Operations Manager is under the general supervision of the assistant division manager.

Planning Controller

A Planning Controller performs the following activities: Ensure separation; Initiate control instructions; Operate interphones; Conduct air/ground communications via data link; Coordinate tactical traffic flows; Scan flight data; Correlate with situation data; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the tactical controller when aware of those instructions.

Traffic Management Coordinators

Traffic Management Coordinators track and predict traffic flows, analyze ground delays, evaluate alternative routing strategies, and plan local traffic patterns at the local facility (ARTCC, TRACON, or Towers)

Traffic Management Specialist

Traffic Management Specialists perform the following activities: Balance air traffic demand with the airspace's capacity to maintain maximum and efficient utilization of the NAS; Coordinate and implement traffic management directives if needed for area of responsibility; Monitor and balance traffic flows within the area of responsibility in accordance with traffic management directives; Evaluate effectiveness of traffic management directives and make necessary adjustments; Document delay information.

Interfaces

System Wide Information Management Build 1A ← (Data Communication) → Unified Decision Management System

UDMS exchanges collaborative decision data via SWIM.

System Wide Information Management Build 1A — (Flight Data) → Unified Decision Management System

UDMS receives flight data via SWIM.

System Wide Information Management Build 1A — (NAS Status Data) → Unified Decision Management System

UDMS receives system status data via SWIM.

System Wide Information Management Build 1A — (Weather Data) → Unified Decision Management System

UDMS receives weather advisory data via SWIM.

Issues

none identified

Service Group Air Traffic Services

Service TM-Strategic Flow

Capability Long Term Planning

Operational Improvement

Provide NAS Wide Sector Demand Prediction and Resource Planning (105104)

Strategic management of personnel and physical asset assignment and airspace modification are required to meet a change in systemic demand due to seasonality or airline city pair business case decisions. This includes proactively adjusting and assigning personnel to an area based on projections of shifting demand.

30-Dec-2013 to 01-Jan-2019

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

This operational improvement combines all NAS resource data with the collaborative decision-making (CDM) data in one, integrated system. Consensus on long-term planning is necessary to match air traffic system capacity with user desires. Strategic long-term planning with dynamic airspace will minimize adverse impacts to users. The Air Traffic Control Systems Command Center (ATCSCC), Airline Operations Centers (AOC), air traffic control facilities, and other users continuously evaluate potential system impacts.

When necessary, changes are modeled against various remedies to mitigate the impacts of the change. Traffic management strategic change decision support tools will model and analyze the effect of a change and develop trend analysis for validation of the planning process. Some of these tools are automated system-to-system while others require the human-centric collaborative decision process. Planning will integrate the activities of Next Generation - Traffic Flow Managements (NG-FTM) store of historical records, the Flight Object Management Systems (FOMS) flight plans, and the Aeronautical Information Management systems (AIM) resource data.

The FAA and the affected stakeholders use the Unified Decision Management System platform to achieve consensus once modeling efforts have been accomplished and analyzed. The FAA has responsibility for managing the NAS; however, the CDM process almost always results in consensus among the stakeholders about proposed resolutions.

Benefits

Improved predictability, efficient use of resources, increased opportunity for access, and flexibility to assign underutilized assets.

Systems

Aeronautical Information Management (key system)

The AIM system represents the evolution of the acquisition, storage, processing and dissemination of aeronautical information in the NAS. Aeronautical information is defined as any information concerning the establishment, condition, or change in any component (facility, service, or procedure of, of hazard) of the National Airspace System. Aeronautical information comes in two types a somewhat static type, and a more dynamic type. The static portion represents the aeronautical information baseline as a particular date, while the dynamic portion updates particular aspects of the static portion due to system impacts or events. The Static portion represents data that NAS automation systems and other users use to adapt their software to properly operate. The dynamic portion represents information typically contained in NOTAMs that indicate short-term changes to the static data.

Many NAS systems support the acquisition, generation, and dissemination of the static aeronautical information. Information of this type includes airspace structures, airways, locations of NAS facilities, inter-facility letters of agreement and memorandums of understanding, obstructions, standard procedures, airspace charts, etc.

Several NAS systems also support the acquisition, generation, processing, and dissemination of the dynamic aeronautical information. Information of this type includes, facility outages, runway closures, temporary flight restrictions, airspace constraints, SIGMETs, etc. This information must be disseminated to users and providers of air traffic services in a timely and efficient manner.

AIM will provide the central point for the dissemination of high quality, configuration controlled information to NAS systems, service providers and users of the NAS. AIM will disseminate data based on the Aeronautical Information Exchange Model (AIXM) protocols.

Flight Data Management - Air Traffic Control System Command Center

The Flight Data Management for Air Traffic Control System Command Center (FDM -ATCSCC) provides the national control center portion of a fully distributed flight data processing capability, using the initial flight object, which includes existing flight plan information and trajectory and performance data (preferred routes, runways). Provides data management and data distribution within the ATCSCC facility.

Flight Object Management System - En Route

The FOMS is a component of the Standard Automation Platform (SAP). The FOMS processes flight data received from multiple sources via the System Wide Information Management (SWIM) Management Unit. The FOMS also receives track data from the Surveillance Data Processor and associates tracks with flight data, producing the flight object, which is published to SWIM for subscriber use. Flight plan support functionality includes end-to-end profile evaluation in all phases of flight and evaluation against static and dynamic constraints (terrain, obstacles, airspace restrictions, etc.). The FOMS supports flight planning up to 180 days prior to day of flight. A user can access the flight object from initial to closeout in the same manner. The FOMS provides end-to-end flight data management from preflight to post analysis. Ownership of the flight object begins and ends with Traffic Flow Management and transitions during the flight to clearance delivery, ramp, surface, departure, transition to cruise, cruise, transition to arrival, and ramp. Flight data management is based on trajectory, assigned volumes, and "necessary" route structure.

Flight Object Management System - Terminal

The FOMS is a component of the Standard Automation Platform (SAP). The FOMS processes flight data received from multiple sources via the System Wide Information Management (SWIM) Management Unit. The FOMS also receives track data from the Surveillance Data Processor (SDP) and associates tracks with flight data, producing the flight object, which is published to SWIM for subscriber use. Flight plan support functionality includes end-to-end profile evaluation in all phases of flight and evaluation against static and dynamic constraints (terrain, obstacles, airspace restrictions, etc.). The FOMS supports flight planning up to 180 days prior to day of flight. A user can access the flight object from initial to closeout in the same manner. The FOMS provides end-to-end flight data management from preflight to post analysis. Ownership of the flight object begins and ends with Traffic Flow Management and transitions during the flight to clearance delivery, ramp, surface, departure, transition to cruise, cruise, transition to arrival, and ramp. Flight data management is based on trajectory, assigned volumes, and "necessary" route structure.

Next Generation Traffic Flow Management (key system)

The Next Generation Traffic Flow Management (NG-TFM) system provides an array of automation and data processing tools for Traffic Management Specialists (TMS) and Traffic Management Coordinators (TMC), as well as a gateway that enables NAS users to make changes in flight schedules based on planned traffic initiatives (e.g., Ground Delay Programs) and other NAS data. This enhanced decision support system provides increased information exchange between FAA service providers and NAS users. NG-TFM receives flight schedules from NAS users (e.g., air carriers) and combines these with weather data, NAS status data, and planned traffic initiatives to generate detailed graphical and textual traffic displays as far as 24 hours into the future on both national and local scales. Features include both pre-flight and post-flight analysis tools, flight data archiving, enhanced traffic displays, traffic strategy (one or more initiatives) automation, "what if" strategy analysis, and automated TFM training tools.

NG-TFM is comprised of five different software component systems and will include a hardware and operating system software tech refresh. The complete NG-TFM software package includes changes to support interfaces with the Flight Object Management System (FOMS) and System Wide Information Management (SWIM). When complete, this will establish a new NG-TFM system baseline.

System Wide Information Management Build 2

SWIM Build 2 provides all items in both 1A and 1B, including air-ground network integration. Build 2 includes integration of SWIM with the Aeronautical Telecommunications Network, Next Generation Air/Ground Communications, Satellite Communications, Ground Based Transceivers, Traffic Information Service-Broadcast, and Flight Information Service-Broadcast.

Unified Decision Management System (key system)

The Unified Decision Making System (UDMS) enhances the Collaborative Decision Making (CDM) process by enabling NAS users and the FAA to share flight schedules, planned traffic initiatives (e.g., Ground Delay Programs), advanced traffic flow predictions, and other NAS data electronically. UDMS upgrades the basic CDM functionality of the TFM-M system hub that connects to user-owned data networks. NAS users gain access to more sophisticated graphical and textual traffic flow predictions, as well as automated planning and analysis tools.

Support Activities

AF Procedure Development for NAS Wide Sector Demand Prediction and Resource Planning

Airway Facilities procedures document the way airway facility operations are to be executed. The introduction of new systems, or changes to existing systems results in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

AF Training for NAS Wide Sector Demand Prediction and Resource Planning

Airway Facilities (AF) training is provided to AF workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AF Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

AT Procedure Development for NAS Wide Sector Demand Prediction and Resource Planning

Air Traffic Procedures document air traffic services and how they are implemented. The introduction of new systems, or changes to existing systems, may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

AT Training for NAS Wide Sector Demand Prediction and Resource Planning

Air Traffic (AT) training is provided to the AT workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AT Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

FAA Adaptation for for NAS Wide Sector Demand Prediction and Resource Planning

Many NAS systems incorporate parameters that are adjustable. This allows for the setting of system parameters to optimize performance at each particular site. When new systems that have adjustable parameters are introduced into the NAS, adaptation data must be developed for the system. Environmental and procedural changes may also result in the need to modify FAA Adaptation Data. Generally, adaptation will begin 12 months before IOC and continue until 12 months after IOC.

FAA Airspace Design for NAS Wide Sector Demand Prediction and Resource Planning

FAA Airspace Design provides the aviation community the description, operational composition, and status of airspace/airport components of the NAS. Generally, airspace design begins six months prior to Initial Operating Capability.

FAA Flight Check for NAS Wide Sector Demand Prediction and Resource Planning

FAA Flight Check is an activity necessary to certify navigational aids required to deliver NAS services. Flight checks ensure that performance standards are met and are completed up to 90 days before Initial Operating Capability to insure safety.

Non-FAA Procedure Development for NAS Wide Sector Demand Prediction and Resource Planning

A number of NAS users document the way their activities are to be carried out. The introduction of new systems, or changes to existing systems may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development will generally begin once ATC procedures have been established and be complete by 90 days prior to Initial Operating Capability, in order to facilitate training.

Non-FAA Training for NAS Wide Sector Demand Prediction and Resource Planning

Non-FAA Training is provided to educate users and their workforces as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional pilot training. Training will generally begin 60 days prior to IOC and be complete within one year following Full Operating Capability.

People

ARTCC Operational Manager In-charge

The ARTCC Operational Manager In-charge (AOMI) provides overall operational supervision to the Area Supervisors assigned to the shift. The AOMI, briefed by the TMU Supervisor on projected traffic for the shift, maintains situational awareness of traffic activities to ensure adequate staffing and optimal operational efficiency for the shift. The AOMI also logs equipment outages and assesses the impact on air traffic. He/she makes the decision to switch from the Host computer to DARC when necessary. The AOMI is also responsible for investigating immediate alerts for possible operational error or operational deviation, keeps immediate alert log up to date, records the outcome of each alert, and notifies Region and/or Headquarters of any occurrences that may become newsworthy. In addition, the AOMI signs for NOTAMS and ALNOTS and ensures proper dissemination.

Airline Operations Center Dispatcher

The Airline Operations Center Dispatcher (AOC Dispatcher) is a major airline employee that enters bulk flight plan requests and works with FAA by revising schedules and providing flight cancellations based on FAA provided data (aggregate demand lists, arrival rates, and parameters for anticipated ground delays.)

Meteorologist

Meteorologists provide accurate and timely weather information for FAA facilities within their area of responsibility. They analyze and interpret real-time weather data from radar, satellites and pilot reports as well as NWS products such as terminal and area forecasts, and in-flight advisories.

National Operations Manager

The National Operations Manager oversees monitoring weather reports and radar to determine when severe storm activity is approaching a facility. Each National Operations Manager is under the general supervision of the assistant division manager.

Planning Controller

A Planning Controller performs the following activities: Ensure separation; Initiate control instructions; Operate interphones; Conduct air/ground communications via data link; Coordinate tactical traffic flows; Scan flight data; Correlate with situation data; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the tactical controller when aware of those instructions.

Traffic Management Coordinators

Traffic Management Coordinators track and predict traffic flows, analyze ground delays, evaluate alternative routing strategies, and plan local traffic patterns at the local facility (ARTCC, TRACON, or Towers)

Traffic Management Specialist

Traffic Management Specialists perform the following activities: Balance air traffic demand with the airspace's capacity to maintain maximum and efficient utilization of the NAS; Coordinate and implement traffic management directives if needed for area of responsibility; Monitor and balance traffic flows within the area of responsibility in accordance with traffic management directives; Evaluate effectiveness of traffic management directives and make necessary adjustments; Document delay information.

Interfaces

no interfaces

Issues

none identified

Service Group Air Traffic Services

Service TM-Strategic Flow

Capability Performance Assessment

Operational Improvement

Current NAS Performance Assessment (105301)

A manual process of analysis supported by the Post Operations Evaluation Tool (POET) to review actions taken and their effect provides input to playbooks and standard operating procedures. Performance assessment covers system status and arrival/departure delay times.

29-May-2002 to 06-Jan-2015

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Every day the performance of the National Airspace System is monitored and assessed on a continuous basis. The primary responsibility for performance assessment is assigned to the David J. Hurley Air Traffic Control System Command Center (ATCSCC) located in Herndon, Virginia. Assessments include determining airspace and airport capacity and possible constraints on the system. Various systems including the Enhanced Traffic Management System (ETMS) along with Traffic Management Units (TMU) in all the major facilities are utilized to collect data to assist in the analysis.

After all pertinent data is collected and analyzed, modeling of various traffic management initiatives is accomplished by the ATCSCC and the impacted Air Route Traffic Control Center (ARTCC), Terminal Radar Approach Control (TRACON), stand alone Air Traffic Control Tower (ATCT), and/or Airline Operations Center (AOC). The modeling evaluates the impact of the implemented restriction on the facilities and users. Modeling is accomplished using methods from simple chalkboard drawings, or by using computer modeling programs such as the Post Operation Evaluation Tool (POET). The actual flight day results are modeled against the plan to determine effectiveness. Additionally, each implementation process must be integrated with other restrictions and constraints to determine overall system effectiveness. Results are then fed back into future planning processes and modeling activities, which support tool development and flight day planning.

Benefits

Current operations are provided in the NAS.

Systems

Collaborative Decision Making Workstation (key system)

The Collaborative Decision Making Workstation (CDM Workstation) is the hardware and software suite used to display output from CDM tools in the Airline Operations Centers (AOCs). This hardware and software is not owned or supported by the FAA.

Enhanced Traffic Management System (key system)

The Enhanced Traffic Management System (ETMS) application is at the heart of the Traffic Flow Management (TFM) system, and through it flows the network of all TFM interfaces. ETMS at the Command Center deals with the strategic flow of air traffic at the national level. ETMS at remote facilities is used for local airspace management within the local facility''s own area of responsibility. To facilitate coordination between the Traffic Management Coordinators (TMC) at remote Traffic Management Units (TMUs) and the Traffic Management Specialists (TMS) at the Air Traffic Control System Command Center (ARTSCC), each local ETMS may can also view the national composite picture of traffic for which the Command Center has responsibility. ETMS enables TMS and TMC personnel to track and predict traffic flows, analyze effects of ground delays or weather delays, evaluate alternative routing strategies, and plan traffic flow patterns.

The ETMS central hub is located at the Volpe National Transportation System Center. The hub collects flight schedules, and revisions, from NAS users, and collects actual traffic situation updates from local ETMS TMUs, and combines these with planned traffic initiatives (e.g., Ground Delay Programs) to generate an Aggregate Demand List (ADL) that is output to users every five (5) minutes. The ADL contains predicted arrival and departure traffic at individual airports. NAS users, e.g., air carriers, can access the ADL data to plan and revise their flight schedules to work more efficiently with planned traffic initiatives. This interactive process of flight planning gives users more input to TMCs on how traffic initiatives will affect them and is the heart of the Collaborative Decision Making (CDM) process.

Traffic Management Units (TMUs) are located throughout the NAS amd perform local flow control management functions. TMUs exist in all Air Route Traffic Control Centers (ARTCCs), 35 high activity Terminal Radar Approach Control (TRACONs), 8 Air Traffic Control Towers (ATCTs), 3 Center Radar Approach (CERAP) facilities, and the WJHTC. TMU hardware suites are automated workstations that include computer entry/readout devices, network communications, Flight Strip Printer (FSP), and a Traffic Situation Display (TSD).

NAS users are responsible for providing their own connectivity to the ETMS hub. The various connective user networks are collectively referred to as the CDM Network (CDMnet) which provides two-way connectivity to ETMS. Non-FAA users do not have access to all ETMS data and processing tools.

Flight Schedule Monitor

The Flight Schedule Monitor (FSM) is the main tool for the traffic management specialist at the Air Traffic Control System

Command Center (ATCSCC) to monitor, model, and implement Ground Delay Program (GDP) operations. FAA and airlines use FSM to monitor demand through receipt of FSM demand pictures of airports updated every 5 minutes. FSM constructs "what if" scenarios for best options (i.e., best parameters) prior to making a GDP decision. Modeling may be used by: (1) the ARTCC TMC to request ATCSCC implementation of a GDP in the event of significant congestion or if a demand/capacity imbalance is projected at an en route fix, route, or sector; (2) the ATCSCC to determine ARTCC start/end times, Airport Arrival Rate (AAR), and other paramters for a particular GDP scenario; and (3) the Airlines to see the effects of cancelling or delaying a specific flights under a GDP.

Reports from the FSM modeling tool for each GDP include: (1) Carrier Statistics showing total minutes of delay for each flight, (2) Airborne Holding Flight Lists of arrival slots, (3) FSM Slot list, (4) Surface Delay histograms, (5) CTA Compliance Alarms for violations of Arrival compliance, (6) CTD Compliance Alarms for violation of Departure compliance, (7) ETEs on significant differences between actual vs ETMS estimated times, and (8) Spurious Flight Alarms triggered upon cancellation of false flights in a substitution stream.

Post Operations Evaluation Tool (key system)

Post Operations Evaluation Tool (POET) is an analysis system that allows users of the National Airspace System (NAS), the Air Traffic Control System Command Center (ATCSCC), Air Route Traffic Control Centers (ARTCC), and other FAA facilities to review the functional status of the NAS and help analyze collaborative routing problems in identifying areas of NAS congestion or inefficiency. A variety of performance metrics (e.g., departure, en route, and arrival delays as well as filed versus actually flown tracks) aid in the analysis.

People

AF Supervisor

An Airway Facilities supervisor may be located in a tower, TRACON, ARTCC or at the Systems Maintenance Office (SMO). The AF supervisor's primary responsibilities are the oversight and deployment of AF personnel and positions to maintain, restore, and certify all the AF systems under his or her responsibility. The AF supervisor is also responsible for overseeing activities at their facility that can impact the NAS such as engineering activities conducted by contractors, FAA personnel, and other government entities.

Airline Operations Center Dispatcher

The Airline Operations Center Dispatcher (AOC Dispatcher) is a major airline employee that enters bulk flight plan requests and works with FAA by revising schedules and providing flight cancellations based on FAA provided data (aggregate demand lists, arrival rates, and parameters for anticipated ground delays.)

Airway Facility Specialist

Airway Facilities specialists are responsible for the certification and maintenance of FAA systems in facilities. The number and types of specialists depend on the number of systems under AF's responsibility. The major categories of specialties for AF personnel include automation, radar, navigation, communication, telecommunications, and environmental. Due to the quantity and complexity of systems within a facility, specialists focus on well-defined and specific areas of responsibilities.

Meteorologist

Meteorologists provide accurate and timely weather information for FAA facilities within their area of responsibility. They analyze and interpret real-time weather data from radar, satellites and pilot reports as well as NWS products such as terminal and area forecasts, and in-flight advisories.

National Operations Manager

The National Operations Manager oversees monitoring weather reports and radar to determine when severe storm activity is approaching a facility. Each National Operations Manager is under the general supervision of the assistant division manager.

Traffic Management Coordinators

Traffic Management Coordinators track and predict traffic flows, analyze ground delays, evaluate alternative routing strategies, and plan local traffic patterns at the local facility (ARTCC, TRACON, or Towers)

Traffic Management Specialist

Traffic Management Specialists perform the following activities: Balance air traffic demand with the airspace's capacity to maintain maximum and efficient utilization of the NAS; Coordinate and implement traffic management directives if needed for area of responsibility; Monitor and balance traffic flows within the area of responsibility in accordance with traffic management directives; Evaluate effectiveness of traffic management directives and make necessary adjustments; Document delay information.

Interfaces

Enhanced Traffic Management System — (Flight Data) → Collaborative Decision Making Workstation
Enhanced Traffic Management System ← (Flight Data) → Enhanced Traffic Management System
Enhanced Traffic Management System ← (Track Data) → Enhanced Traffic Management System
Enhanced Traffic Management System ← (Weather Data) → Enhanced Traffic Management System
Enhanced Traffic Management System — (Flight Data) → Post Operations Evaluation Tool

Issues

none identified

Service Group Air Traffic Services
Service TM-Strategic Flow
Capability Performance Assessment
Operational Improvement

Enhance NAS Performance Assessment (105302)

Assessment evaluates performance of airport, tower, terminal radar approach control facilities, and en route facilities. The analysis highlights where throughput is constrained and becomes the basis for strategic long-term planning. Evaluations of predicted scenarios and planning provide feedback for tool development and future planning.
01-Jun-2021 to 01-Jan-2019

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

The National Airspace System (NAS) is monitored and assessed on a continuous basis. The primary responsibility for performance assessment is assigned to the David J. Hurley Air Traffic Control System Command Center (ATCSCC). The evolution to a highly automated performance assessment capability will include strategic flow plan assessment, strategic tool performance, and resource allocation effectiveness. The long-term planning function benefits from an assessment of tool performance. This tool assessment improves the productivity and capacity of the system by producing predictions and plans that are based on an accurate tool that has been validated.

Performance assessment becomes a real-time activity feedback tool, not just a post-event analysis process. By using Next Generation - Traffic Flow Management (NG-TFM) information displayed on an Integrated Information Workstation (IIW), traffic managers are alerted when the performance of the system is out of tolerance with the current collaborative planning. The System Wide Information Management (SWIM) Unit will make the collection and distribution of strategic performance information available to users and to traffic managers in all the major facilities on demand for analysis via the SWIM system. Key personnel at various facilities and in the user community will be able to update their daily plan to mitigate the impact of previous unknowns in the system or modeling tool.

Improvements to the Post Operation Evaluation Tool (POET) suite will include full descriptive and diagnostic measures. The performance assessment model of traffic management decisions uses data available via SWIM to assess real-time performance including: compliance monitoring of strategic and tactical plans and effectiveness of any imposed restrictions. The Flight Schedule Monitor (FSM) using flight plan information from the Flight Object Management System (FOMS), and post-event surveillance from the Surveillance Data Node will provide distance-based, multi-fix, and multiple airport management plan evaluations. Additionally, the Flight Schedule Analyzer (FSA) will provide a system user, flight- or fleet-specific day of operation performance report. Assessments include determining the effectiveness or airspace and airport capacity planning against the anticipated constraints on the system. Increased use of system-to-system coordination and automated tools will determine NAS infrastructure performance and needed actions. Better information, planning, and collaboration will increase predictability.

Automatic collection of airspace and airport throughput information supports real-time analysis. Changes to previously forecast events will be analyzed and presented to the service provider and user so that adjustments to flight day planning, future planning assumptions, and model refinement can be made. Collaborative planning tools contained in the Unified Decision Management System (UDMS) are able to adjust their performance plans as the NAS unfolds its daily anomalies.

Benefits

Productivity is increased through effective resource allocation. Predictability of available resources will improve access and increase capacity.

Systems

Flight Data Management - Air Traffic Control System Command Center

The Flight Data Management for Air Traffic Control System Command Center (FDM -ATCSCC) provides the national control center portion of a fully distributed flight data processing capability, using the initial flight object, which includes existing flight plan information and trajectory and performance data (preferred routes, runways). Provides data management and data distribution within the ATCSCC facility.

Flight Object Management System - Terminal (key system)

The FOMS is a component of the Standard Automation Platform (SAP). The FOMS processes flight data received from multiple sources via the System Wide Information Management (SWIM) Management Unit. The FOMS also receives track data from the Surveillance Data Processor (SDP) and associates tracks with flight data, producing the flight object, which is published to SWIM for subscriber use. Flight plan support functionality includes end-to-end profile evaluation in all phases of flight and evaluation against static and dynamic constraints (terrain, obstacles, airspace restrictions, etc.). The FOMS supports flight planning up to 180 days prior to day of flight. A user can access the flight object from initial to closeout in the same manner. The FOMS provides end-to-end flight data management from preflight to post analysis. Ownership of the flight object begins and ends with Traffic Flow Management and transitions during the flight to clearance delivery, ramp, surface, departure, transition to cruise, cruise, transition to arrival, and ramp. Flight data management is based on trajectory, assigned volumes, and "necessary" route structure.

Flight Schedule Analyzer

The Flight Schedule Analyzer (FSA) consists of post analysis (PA) and real-time (RT) components. PA FSA graphically shows data and analysis results on how well a Ground Delay Program (GDP) performed and what factors affected performance. RT FSA generates a collection of reports that allow the specialists at Airlines and the Air Traffic Control System Command Center (ATCSCC) to monitor GDPs of specific flights as they are executing. Real-time FSA may also be used to monitor "Pop Ups" (flights for which ETMS has no scheduling data) to airports. Airlines use FSA data to internally address situations to assess the effectiveness of GDP and to improve demand predictions. RT FSA is accessible from the ATCSCC intranet web page and generates reports including: (1) Performance, (2) Flight Status, (3) Compliance, (4) Cancelled flights that operated, (5) Pop-up flights, (6) Time-out delayed flights, and (7) GDP Program events.

Integrated Information Workstation - Build 1 (key system)

IIW Build 1 will include the infrastructure and system interfaces to acquire, analyze, store, update, display, and manage the following information in an integrated manner: (1) National Airspace System (NAS) aeronautical, (2) airport environmental, (3) airborne and surface surveillance, (4) flight information, (5) weather information, and (6) NAS status. Build 1 will also replace its predecessor system, FAA Data Display System, as well as interface with the following systems in support of its mission: Flight Object Management, System Wide Information Management, Next Generation- Traffic Flow Management, Maintenance Management System, Unified Decision Management System, and Aeronautical Information Management.

National Airspace System Infrastructure Management System Phase 2 (key system)

National Airspace System Infrastructure Management System (NIMS) Phase 2 will enhance resource and enterprise management, by developing NAS customer and user interaction tools, and providing additional performance and cost trend analysis. The NIMS will provide status information to all NAS users in near real time via the System Wide Information Management (SWIM) system. NIMS Phase 2 will enhance NIMS Phase 1 by providing the tools to achieve the concept of NAS Infrastructure Management (NIM). This new approach to the operation and maintenance of the NAS infrastructure will incorporate a performance-based service management approach that is focused on achieving user and customer satisfaction and managing NAS infrastructure services. The key characteristics of the NIM concept are: 1. Consolidating expertise in control centers to provide rapid, effective response to customer needs, support centralized operational control, and gain efficiencies. 2. Centralized Remote Monitoring and Control of NAS infrastructure services and systems to provide efficient service delivery and systems management. 3. Nationwide Operations Planning to provide standardized field operations across the NAS to facilitate consistent interaction with customers. 4. Information Infrastructure to provide real-time information collection and distribution to provide common NAS performance metrics and cost accounting. 5. Performance Based Management to provide data for the prioritization of maintenance activities and investment decisions.

The NIMS Enterprise Management (EM) will monitor and control NAS subsystems, equipment, resources and the NIMS. An Enterprise Manager Suite, consisting of commercially available hardware and software components, is installed at each of the four Operations Control Centers. The NIMS Resource Manager (RM) will support all NIMS Resource Functions. The NIMS RM, consisting of commercially available hardware and software components, is installed at each of the four Operations Control Centers.

The NIMS Enterprise Manager will be integrated with the NIMS Resource Manager to provide, Automated Incident Ticketing, a Common Logging System, Real Time System Performance Monitoring, and a Centralized Logistics/Maintenance System.

National Airspace System Infrastructure Management System Phase 3 (key system)

National Airspace System Infrastructure Management System (NIMS) Phase 3 will enhance Phase 2 enterprise and resource management, by further developing NAS customer and user interaction tools, and provide additional performance and cost trend analysis.

The NIMS Enterprise Management (EM) will monitor and control NAS subsystems, equipment and resources. The NIMS will provide status information to all NAS users in near real time via the System Wide Information Management (SWIM) system. An Enterprise Manager Suite, consisting of commercially available hardware and software components, is installed at each of the four Operations Control Centers. The NIMS Resource Manager (RM) will support all NIMS Resource Functions. The NIMS RM, consisting of commercially available hardware and software components, is installed at each of the four Operations Control Centers.

The NIMS Enterprise Manager will be integrated with the NIMS Resource Manager to provide, Automated Incident Ticketing, a Common Logging System, Real Time System Performance Monitoring, and a Centralized Logistics/Maintenance System.

Next Generation Traffic Flow Management (key system)

The Next Generation Traffic Flow Management (NG-TFM) system provides an array of automation and data processing tools for Traffic Management Specialists (TMS) and Traffic Management Coordinators (TMC), as well as a gateway that enables NAS users to make changes in flight schedules based on planned traffic initiatives (e.g., Ground Delay Programs) and other NAS data. This enhanced decision support system provides increased information exchange between FAA service providers and NAS users. NG-TFM receives flight schedules from NAS users (e.g., air carriers) and combines these with weather data, NAS status data, and planned traffic initiatives to generate detailed graphical and textual traffic displays as far as 24 hours into the future on both national and local scales. Features include both pre-flight and post-flight analysis tools, flight data archiving, enhanced traffic displays, traffic strategy (one or more initiatives) automation, "what if" strategy analysis, and automated TFM training tools.

NG-TFM is comprised of five different software component systems and will include a hardware and operating system software tech refresh. The complete NG-TFM software package includes changes to support interfaces with the Flight Object Management System (FOMS) and System Wide Information Management (SWIM). When complete, this will establish a new NG-TFM system baseline.

Standard Automation Platform Convergence Phase 1 (key system)

The purpose of Standard Automation Platform Convergence Phase 1 (SAP Conv P1) is to reduce both procurement and recurring costs by standardizing and sharing as many hardware and software ATC Automation components as possible.

An engineering convergence task will begin in fiscal year 2005 and run through 2015. All components from each of the automation systems (STARS, ERAM, TFM, etc.) will be analyzed, and the "best of breed" and "core" components will be selected. SAP convergence will be performed in the following areas: (1) Hardware; (2) System Software (operating systems, Commercial-Off-The-Shelf tools, etc.); (3) ATC applications that can be shared across domains; (4) ATC applications that are unique to a domain; and (5) ATC system support tools that can be shared across domains (adaptation, data extraction or systems analysis recording, data reduction and analysis tools, etc.). Proven STARS and ERAM components will be slected, integrated into the SAP, and rigorously tested for replacing STARS and ERAM components at or near their end of service life.

Prototyping begun under Phase 1 will continue with SAP Conv P2. The results of both efforts will lead to refining the requirements to develop the SAP WS mechanism with SDP and FOMS applications.

Standard Automation Platform Remote Workstation Phase 2 (key system)

Provides Technical Refresh of SAP Remote Workstation Phase 1. The SAP RW provides the controller in the tower and the specialist in Flight Advisory Services an interface to the Flight Object Management System and Surveillance Data Processor. The workstation additionally provides the tower controller a display of arrival/departure surveillance data.

Surveillance Data Network (key system)

National Airspace System (NAS) surveillance systems, including radar and automatic dependent surveillance systems will provide surveillance data objects via the Surveillance Data Network (SDN), which is a sub-network of the System Wide Information Management (SWIM) and the FAA Telecommunication Infrastructure (FTI). The published Surveillance Data Objects (SDO) will be made available to NAS and other users, including the Transportation Security Administration, Department of Defense, and others. Surveillance data availability supports 3-mile separation standards, gate-to-gate traffic management, seamless airspace, and dynamic resectorization. Improved surveillance information is provided in a timely and consistent manner seamlessly across the NAS for operations, planning, and decision making. The information will be available to all users and service providers via SDO in near real time. This information enables decisions to be based on a shared common view of situations, even as conditions are changing. Improved surveillance with SDOs will provide the automation higher quality of data for seamless surveillance and, in combination with other capabilities and new procedures, enable capacity and safety improvements. These benefits accrue from increased situation awareness by decision makers and improved operation of decision support and analysis tools that use surveillance information.

System Wide Information Management Build 1B (key system)

Build 1B provides all items in 1A, including more NAS information. This build integrates Flight and Surveillance Information systems into the SWIM architecture.

Unified Decision Management System (key system)

The Unified Decision Making System (UDMS) enhances the Collaborative Decision Making (CDM) process by enabling NAS users and the FAA to share flight schedules, planned traffic initiatives (e.g., Ground Delay Programs), advanced traffic flow predictions, and other NAS data electronically. UDMS upgrades the basic CDM functionality of the TFM-M system hub that connects to user-owned data networks. NAS users gain access to more sophisticated graphical and textual traffic flow predictions, as well as automated planning and analysis tools.

Support Activities

AF Procedure Development for Enhanced NAS Performance Assessment

Airway Facilities procedures document the way airway facility operations are to be executed. The introduction of new systems, or changes to existing systems results in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

AF Training for Enhanced NAS Performance Assessment

Airway Facilities (AF) training is provided to AF workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AF Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

AT Procedure Development for Enhanced NAS Performance Assessment

Air Traffic Procedures document air traffic services and how they are implemented. The introduction of new systems, or changes to existing systems, may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

AT Training for Enhanced NAS Performance Assessment

Air Traffic (AT) training is provided to the AT workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AT Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

FAA Adaptation for Enhanced NAS Performance Assessment

Many NAS systems incorporate parameters that are adjustable. This allows for the setting of system parameters to optimize performance at each particular site. When new systems that have adjustable parameters are introduced into the NAS, adaptation data must be developed for the system. Environmental and procedural changes may also result in the need to modify FAA Adaptation Data. Generally, adaptation will begin 12 months before IOC and continue until 12 months after IOC.

FAA Airspace Design for Enhanced NAS Performance Assessment

FAA Airspace Design provides the aviation community the description, operational composition, and status of airspace/airport components of the NAS. Generally, airspace design begins six months prior to Initial Operating Capability.

FAA Certification for Enhanced NAS Performance Assessment

FAA certification is an activity necessary to support people and systems in the delivery of NAS services. Avionics and associated systems are deemed to be critical to the safety of flight and must be certificated. In addition certain operators and service providers require to be certified such as pilots, dispatchers and others. Certification will generally begin 24 months prior to Initial Operating Capability, and be complete prior to receiving or giving service.

FAA Flight Check for Enhanced NAS Performance Assessment

FAA Flight Check is an activity necessary to certify navigational aids required to deliver NAS services. Flight checks ensure that performance standards are met and are completed up to 90 days before Initial Operating Capability to insure safety.

Non-FAA Pilot Procedure Development for Enhanced NAS Performance Assessment

A number of NAS users document the way their activities are to be carried out. The introduction of new systems, or changes to existing systems may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development will generally begin once ATC procedures have been established and be complete by 90 days prior to Initial Operating Capability, in order to facilitate training.

Non-FAA Pilot Training for Enhanced NAS Performance Assessment

Non-FAA Pilot Training is provided to educate pilots as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional pilot training. Training will generally begin 60 days prior to IOC and be complete within one year following Full Operating Capability.

Non-FAA Procedure Development for Enhanced NAS Performance Assessment

A number of NAS users document the way their activities are to be carried out. The introduction of new systems, or changes to existing systems may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development will generally begin once ATC procedures have been established and be complete by 90 days prior to Initial Operating Capability, in order to facilitate training.

Non-FAA Training for Enhanced NAS Performance Assessment

Non-FAA Training is provided to educate users and their workforces as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional pilot training. Training will generally begin 60 days prior to IOC and be complete within one year following Full Operating Capability.

People

AF Facilities Specialist

AF Facilities Specialist maintain facility systems such as HVAC and power for their area of responsibility. Their duties include troubleshooting failures, performing corrective maintenance, certifying systems are operational, and performing preventive maintenance.

AF Supervisor

An Airway Facilities supervisor may be located in a tower, TRACON, ARTCC or at the Systems Maintenance Office (SMO). The AF supervisor's primary responsibilities are the oversight and deployment of AF personnel and positions to maintain, restore, and certify all the AF systems under his or her responsibility. The AF supervisor is also responsible for overseeing activities at their facility that can impact the NAS such as engineering activities conducted by contractors, FAA personnel, and other government entities.

ARTCC Operational Manager In-charge

The ARTCC Operational Manager In-charge (AOMI) provides overall operational supervision to the Area Supervisors assigned to the shift. The AOMI, briefed by the TMU Supervisor on projected traffic for the shift, maintains situational awareness of traffic activities to ensure adequate staffing and optimal operational efficiency for the shift. The AOMI also logs equipment outages and assesses the impact on air traffic. He/she makes the decision to switch from the Host computer to DARC when necessary. The AOMI is also responsible for investigating immediate alerts for possible operational error or operational deviation, keeps immediate alert log up to date, records the outcome of each alert, and notifies Region and/or Headquarters of any occurrences that may become newsworthy. In addition, the AOMI signs for NOTAMS and ALNOTS and ensures proper dissemination.

Airline Operations Center Dispatcher

The Airline Operations Center Dispatcher (AOC Dispatcher) is a major airline employee that enters bulk flight plan requests and works with FAA by revising schedules and providing flight cancellations based on FAA provided data (aggregate demand lists, arrival rates, and parameters for anticipated ground delays.)

Meteorologist

Meteorologists provide accurate and timely weather information for FAA facilities within their area of responsibility. They analyze and interpret real-time weather data from radar, satellites and pilot reports as well as NWS products such as terminal and area forecasts, and in-flight advisories.

National Operations Manager

The National Operations Manager oversees monitoring weather reports and radar to determine when severe storm activity is approaching a facility. Each National Operations Manager is under the general supervision of the assistant division manager.

Planning Controller

A Planning Controller performs the following activities: Ensure separation; Initiate control instructions; Operate interphones; Conduct air/ground communications via data link; Coordinate tactical traffic flows; Scan flight data; Correlate with situation data; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the tactical controller when aware of those instructions.

Rescue Coordination Center Specialist

Rescue Coordination Center People consist of personnel from the United States Coast Guard and the United States Air Force who receive information about overdue or missing aircraft from the FAA and coordinate the search and rescue activities within their respective regions.

Supervisory Air Traffic Control Specialist

The supervisor is responsible for overall facility operations during an assigned shift. Duties include ensuring adequate staffing for the operational situation, monitoring operational positions, and ensuring functions are performed in accordance with directives.

Surface Vehicle Operator

Ground personnel operate vehicles on the airport surface to support aircraft service, maintenance and other operations. Ground, local, or ramp controllers may provide separation from other ground traffic (aircraft or vehicles) at controller airports. Pilots and ground personnel work together to ensure safe movement of aircraft at all airports.

Tactical Controller

A Tactical Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios and data link; Oversee data link communications by the associate tactical controller; Accept and initiate automated handoffs; Assist the planning controller with non-automated handoff actions when needed; Assist the planning controller in coordination when needed; Scan the situation display; Correlate with flight data; Ensure computer entries are completed on instructions or clearances you issue or receive.

Traffic Management Coordinators

Traffic Management Coordinators track and predict traffic flows, analyze ground delays, evaluate alternative routing strategies, and plan local traffic patterns at the local facility (ARTCC, TRACON, or Towers)

Traffic Management Specialist

Traffic Management Specialists perform the following activities: Balance air traffic demand with the airspace's capacity to maintain maximum and efficient utilization of the NAS; Coordinate and implement traffic management directives if needed for area of responsibility; Monitor and balance traffic flows within the area of responsibility in accordance with traffic management directives; Evaluate effectiveness of traffic management directives and make necessary adjustments; Document delay information.

Interfaces

Flight Object Management System - Terminal ← (Data Communication) → Integrated Information Workstation - Build 1

FOMS sends traffic management decision support tool information to IIW. IIW serves as the controller interface to the tools.

Flight Object Management System - Terminal ← (Flight Data) → Next Generation Traffic Flow Management

FOMS and NG-TFM exchange flight data.

Flight Object Management System - Terminal — (Flight Data) → Standard Automation Platform Remote Workstation Phase 2

FOMS exchanges flight plan data with the SAP RW.

National Airspace System Infrastructure Management System Phase 2 ← (NAS Status Data) → National Airspace System Infrastructure Management System Phase 2

The NIMS master systems interfaces with the NIMS client systems to share files, monitor messages and allow communications between maintenance data terminals anywhere within the NIMS network.

National Airspace System Infrastructure Management System Phase 2 — (NAS Status Data) → System Wide Information Management Build 1B

"NIMS provides equipment status data to SWIM for distribution to systems, including, AIM, FOMS, and the IIW, and users, including the AOC.

National Airspace System Infrastructure Management System Phase 3 ← (NAS Status Data) → National Airspace System Infrastructure Management System Phase 3

The NIMS master systems interfaces with The NIMS client systems to share files, monitor messages and allow communications between maintenance data terminals anywhere within the NIMS network.

National Airspace System Infrastructure Management System Phase 3 — (NAS Status Data) → System Wide Information Management Build 1B

"NIMS provides equipment status data to SWIM for distribution to systems, including, AIM, FOMS, and the IIW, and users, including the AOC.

Next Generation Traffic Flow Management — (Data Communication) → Integrated Information Workstation - Build 1

NG-TFM provides traffic flow management data to the IIW for display to controllers.

Next Generation Traffic Flow Management ← (Data Communication) → System Wide Information Management Build 1B

NG-TFM exchanges strategic flow data via SWIM.

System Wide Information Management Build 1B — (NAS Status Data) → Flight Object Management System - Terminal

FOMS receives NAS status data via SWIM.

System Wide Information Management Build 1B — (Weather Data) → Flight Object Management System - Terminal

FOMS receives weather products from GWP and other sources via SWIM.

System Wide Information Management Build 1B — (Flight Data) → Next Generation Traffic Flow Management

NG-TFM receives flight object data via SWIM.

System Wide Information Management Build 1B — (NAS Status Data) → Next Generation Traffic Flow Management

"NG-TFM receives NAS status data, including airspace changes and oceanic constraints, via SWIM.

System Wide Information Management Build 1B — (Weather Data) → Next Generation Traffic Flow Management

NG-TFM receives weather advisory data via SWIM.

System Wide Information Management Build 1B ← (Data Communication) → Unified Decision Management System

UDMS exchanges collaborative decision data via SWIM.

System Wide Information Management Build 1B — (Flight Data) → Unified Decision Management System

UDMS receives flight data via SWIM.

System Wide Information Management Build 1B — (NAS Status Data) → Unified Decision Management System

UDMS receives system status data via SWIM.

System Wide Information Management Build 1B — (Weather Data) → Unified Decision Management System

UDMS receives weather advisory data via SWIM.

Issues

none identified

Service Group Air Traffic Services

Service TM-Synchronization

Capability Airborne

Operational Improvement

Current Arrival/Departure Sequencing (104109)

Airborne spacing and sequencing of air traffic safely maximizes NAS efficiency and capacity in the terminal portion of the arrival and departure phases of flight. Air traffic controllers provide traffic synchronization to aircraft by monitoring the situation, making control decisions, and modifying flight trajectories to meet operational objectives and accommodate user preferences. Controllers optimize the arrival and departure portion of flight by sequencing and spacing aircraft on final approach and departure. They apply separation standards to achieve efficient use of airports by applying manual controller optimization procedures. Traffic specialists and controllers use traffic displays and flight strips to establish flow initiatives, such as reassignment of flows (arrival and departure) to runways. This includes sequencing and spacing aircraft on closely spaced, parallel runways in visual meteorological conditions and instrument meteorological conditions.

01-May-2001 to 30-Dec-2015

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

The spacing and sequencing of air traffic safely maximizes the efficiency and capacity of the NAS throughout the arrival and departure phases of flight. Air traffic controllers optimize the arrival and departure portion of flight by sequencing and spacing aircraft on final approach and coordinating arrival and departure air traffic with adjacent air traffic control facilities. The primary factor in establishing spacing and sequencing is the principle of "first come, first served". Other factors may include emergencies, presidential movement, lifeguard, etc. Controllers apply separation standards to achieve efficient use of airports and the navigable airspace between them.

Traffic Management Coordinators (TMCs) establish initial traffic management planning and anticipated flow rates using arrival/departure rates and current/anticipated airport conditions. TMC functionality is distributed throughout the NAS to traffic management units at Air Route Traffic Control Centers (ARTCCs), high-activity Terminal Radar Approach Control (TRACON) facilities, and at the highest-activity airport traffic control towers (ATCTs). Each plays a role in arrival and departure sequencing, depending upon the current conditions. The TRACON plays a major role in the spacing and sequencing in the terminal area. Arrival traffic is sequenced by using speed control and vectoring until cleared for the appropriate approach. Departures are handled in a similar manner with speed control and vectoring until transitioned to the en route environment. Additionally the Departure Spacing Program (DSP) evaluates aircraft flight plans at participating airports, models projected aircraft demand at shared departure fixes, and provides windows of departure times to controllers based on projected fix crossing times.

In performing traffic synchronization functions, controllers receive input from various sources such as, voice and data communications, and weather and automation systems. Voice inputs include Pilot Reports (PIREPS) via radio from aircraft, coordination air traffic control towers, other TRACON positions, adjacent ATC facilities, Traffic Management Unit (TMU), and the TRACON area supervisor.

Data inputs include track and weather data from Airport Surveillance Radar (ASR) and Air Traffic Control Beacon Interrogator (ATCBI)- Model 5/Mode S, and intent/flight plan data from the Host Computer System (HCS). The controller may also enter information directly.

Benefits

Current operations are provided in the NAS.

Systems

Air Route Surveillance Radar - Model 1E

The Air Route Surveillance Radar - Model 1E (ARSR-1E) is a 1970s analog radar. It is a long-range radar system with a maximum detection range of 200 nm. The ARSR-1E is a surveillance system used to detect azimuth and slant range of en route aircraft operating between terminal areas. It also provides weather intensity data.

Air Route Surveillance Radar - Model 2

The Air Route Surveillance Radar - Model 2 (ARSR-2) is a 1970s analog radar. It is a long-range radar system with a maximum detection range of 200 nm. The ARSR-2 is a surveillance system used to detect azimuth and slant range of en route aircraft operating between terminal areas. It also provides weather intensity data.

Air Traffic Control Beacon Interrogator - Model 4

The Air Traffic Control Beacon Interrogator - Model 4 (ATCBI-4) is an air traffic control (ATC) beacon system that interrogates transponder-equipped aircraft. It is a secondary radar system that interrogates transponders, receives aircraft identification, and determines position data.

Air Traffic Control Beacon Interrogator - Model 5

The Air Traffic Control Beacon Interrogator - Model 5 (ATCBI-5) is an air traffic control (ATC) beacon system that interrogates transponder-equipped aircraft. It is a secondary radar system that interrogates transponders, receives aircraft identification, and determines position data.

Air Traffic Control Beacon Interrogator - Model 6

The Air Traffic Control Beacon Interrogator Model 6 (ATCBI-6) is a ground-based system that interrogates transponders, receives and processes replies from transponders, determines the range and azimuth to the aircraft, and forwards the information to appropriate air traffic control (ATC) automation systems. Replies provide identification and altitude data of the transponder.

Airport Surveillance Radar - Model 11

The Airport Surveillance Radar- Model 11 (ASR-11) is a digital, combined primary and secondary surveillance radar (SSR), short-range radar system with a 60 nautical mile (nmi) detection range for medium and small activity airports. The ASR-11 provides advanced digital primary radar including weather intensity surveillance with an integrated monopulse SSR system for use in the airport terminal area. The ASR-11 is used to detect and report the presence and location of an aircraft in a specific volume of airspace. The ASR-11 provides search radar surveillance coverage in controlled airspace primarily in terminal areas.

Airport Surveillance Radar - Model 7 (key system)

The Airport Surveillance Radar - Model 7 (ASR-7) is a short-range (60 nm) analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the Air Traffic Control Beacon Interrogator - Model 4 or Model 5 (ATCBI-4 or ATCBI-5) or Mode S. This system will be replaced by the ASR-11.

Airport Surveillance Radar - Model 8 (key system)

The Airport Surveillance Radar - Model 8 (ASR-8) is a short-range (60 nm), analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the Air Traffic Control Beacon Interrogator - Model 4 or Model 5 (ATCBI-4 or ATCBI-5) or Mode S.

Airport Surveillance Radar - Model 9 (key system)

The Airport Surveillance Radar - Model 9 (ASR-9) is a short range (60 nm) radar system for the airport terminal area. The ASR-9 processes the returns from aircraft targets, which includes demodulation, analog-to-digital conversion, range and azimuth gating, sensitivity timing control, and a moving target detection function. The moving target detector includes two-level weather contour processing, digital signal processing, correlation and interpolation processing, and surveillance processing. The ASR-9 has a separate weather channel with associated processing capable of providing six-level weather contours. The two-level weather contour processing associated with the moving target detector is only be used for backup. The six-level weather channel is primarily used to supplement Next Generation Weather Radar (NEXRAD) coverage. It is normally used in conjunction with Mode Select (Mode S) but it can accommodate an Air Traffic Control Beacon Interrogator Model 4/5 (ATCBI-4/5).

The ASR-9 will be upgraded/replaced with the ASR-9/Mode S SLEP (see separate mechanism) in the 2007-12 time frame.

Automated Radar Terminal System - Model IIE (key system)

The Automated Radar Terminal System - Model IIE (ARTS IIE) provides radar data processing (RDP) and decision support tools to the controller in the terminal environment. Utilized at low to medium-size Terminal Radar Control (TRACONs) Facilities the ARTS IIE is capable of receiving input from up to 2 sensors, can process up to 256 tracks simultaneously, and support up to 22 displays. The ARTS IIE implements the Common ARTS software for improved performance maintenance efficiency. The radar data processing (RDP) software provides automated surveillance tracking and display processing. Included in the ARTS IIE software are decision support tools such as Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Mode C intruder alert, Converging Runway Display Aid (CRDA), and Controller Automation Spacing Aid (CASA).

Automated Radar Terminal System - Model IIIA (key system)

The Automated Radar Terminal System - Model IIIA (ARTS IIIA) provides radar data processing (RDP) and decision support tools to the controller in the terminal environment. Utilized at larger airports, ARTS IIIA is capable of receiving input from up to three sensors, can process up to 900 tracks simultaneously and support up to 36 displays. The RDP software provides automated surveillance tracking and display processing. Included in the ARTS IIIA software are decision support tools such as Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Mode C intruder alert, Converging Runway Display Aid (CRDA), Final Monitor Aid (FMA), and controller automation spacing aid.

Automated Radar Terminal System - Model IIIE (key system)

The Automated Radar Terminal System - Model IIIE (ARTS IIIE) consists of the hardware platform and software required providing radar data processing (RDP) and decision support tools to the controller in the terminal environment. The ARTS IIIE is used at consolidated Terminal Radar Approach Control (TRACON) facilities. The Common ARTS program provided an ARTS IIIE capable of receiving input from up to 15 sensors, the ability to process up to 10,000 tracks simultaneously, and support up to 223 displays. The RDP software provides automated surveillance tracking and display processing including mosaic display of radar data. Included in the ARTS IIIE software are decision support tools such as Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Mode C intruder alert, Converging Runway Display Aid (CRDA), Final Monitor Aid (FMA), and controller automation spacing aid.

Automated Radar Terminal System Color Display

The Automated Radar Terminal System (ARTS) Color Display (ACD) is a high performance, full function, color display that replaces the Full Digital ARTS Display (FDAD) and the Data Entry and Display Subsystem (DEDS). The ACD supports keyboard and trackball functions for the ARTS IIA, ARTS IIE, and ARTS IIIE. A primary and secondary radar data path to the ACD is provided by a radar gateway function incorporated in the event of a failure of either the ARTS IIE and ARTS IIIA processing systems.

Automated Surface Observing System

The Automated Surface Observing System (ASOS) is an automated observing weather system sponsored by the FAA. ASOS provides weather observations, which include: temperature, dew point, wind, altimeter setting, visibility, sky condition, and precipitation. ASOS routinely and automatically provides a computer-generated voice to provide weather information directly to aircraft in the vicinity of airports using FAA very high frequency (VHF) ground-to-air radio. In addition, the same information is available through a dial-in telephone and most of the data is provided on the national weather data network.

Automatic Direction Finder

Automatic Direction Finder (ADF) - An aircraft radio navigation system which senses and indicates the direction to a L/MF nondirectional radio beacon (NDB) ground transmitter. Direction is indicated to the pilot as a magnetic bearing or as a relative bearing to the longitudinal axis of the aircraft depending on the type of indicator installed in the aircraft. In certain applications, such as military, ADF operations may be based on airborne and ground transmitters in the VHF/UHF frequency spectrum.

Backup Emergency Communications

Back Up Emergency Communications (BUEC) provides a secondary A/G communications path for the en route environment, giving each controller access to another completely diverse radio channel. The original system, previously employed at all 20 CONUS ARTCCs, uses a limited number of tunable transceivers that are shared by a greater number of controllers through a priority system at the ARTCC.

The old BUEC is being replaced with dedicated BUEC channels on a one per sector basis to solve a serious supportability problem with the 30+-year-old system and to provide each controller with improved back up radio coverage. The new BUEC outlets have been sited for best coverage for the sectors"" service volumes that because of size require multiple RCAGs for coverage will have multiple BUEC sites. The program has no prime contractor. All activities including site selection, engineering, site preparation, transition, and testing are performed by the ANI and regional personnel. The Product Team provides equipment and funding for implementation. The new BUEC system employs the same equipment as the RCAGs.

Backup Emergency Communications Replacement

The Backup Emergency Communications (BUEC) Replacement (BUEC Repl) mechanism replaces existing analog BUEC system with an updated analoq BUEC system. Also provides backup for Remote Communications Air-Ground Facility (RCAG) very high frequency (VHF) and ultra high frequency (UHF) communications channels (radio equipment) that are available to an Air Route Traffic Control Center (ARTCC) for immediate use if one or more primary RCAG frequencies fail. The system consists of remotely controlled equipment, and several VHF and UHF transceivers. A typical BUEC system may provide as many as 60 VHF and UHF transceivers for an ARTCC.

Digital Bright Radar Indicator Tower Equipment

The Digital Bright Radar Indicator Tower Equipment (DBRITE) is a tower display system that provides a raster scan presentation of radar/beacon videos and automation system alphanumeric data. The system accepts radar, beacon, external map, analog data, and automation system data.

Digital Voice Recorder System

Provides modern digital voice recording devices used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

In Feburary 2004, the DVRS was upgraded with a 24-channel card, which replaced the 16-channel card. This minor upgrade, called DVR II, was not extended to the systems installed prior to February 2004.

Direct Access Radar Channel

The Direct Access Radar Channel (DARC) provides a back-up processing path to provide surveillance data to the displays in the event of a primary channel (Host Computer System (HCS) failure. The DARC path is a physically, logically and electrically separate processing path (with diverse hardware and software) from the primary Host Computer System (HCS) Radar Data Processing (RDP) paths. Thus DARC provides a tertiary path, to keep radar data on the controller"s displays, should both HCS RDP paths be disabled for any reason. The DARC provides radar data processing, very limited flight data processing, but with significantly less functionality than the HCS. Basically, DARC serves as a lifeboat should both HCS processing paths become disabled.

Distance Measuring Equipment

Distance Measuring Equipment (DME) is a UHF (Ultra High Frequency) ground-based radio navigation aid. DME avionics transmit interrogation pulses, and the ground-based responder sends a reply. The avionics process the reply and determine the slant range between the aircraft and the ground station. Separate funding segments and acquisition projects have been established for two generic classes of DME ground stations: High power (en route) DMEs, and low power (terminal) DMEs. This mechanism addresses the high power DMEs.

DMEs may be provided alone, but are more often collocated with a VOR to form a VOR/DME facility, allowing aircraft to determine both the bearing and slant range to the ground station - and hence a navigational position fix. DMEs are approved as a primary navigation system in the NAS. The DME function is frequently provided by the TACAN system that also provides azimuth guidance to military users. (DME and the distance-measuring portion of TACAN are functionally the same.) When combined with a VOR, these facilities are called VORTACs.

The DME network will be sustained to support en route navigation and to serve as an independent backup navigation source to GPS and GPS/WAAS. The DME network may also need to be expanded to provide a redundant area navigation (RNAV) capability for terminal area operations at major airports.

Distance Measuring Equipment Avionics

Distance Measuring Equipment Avionics (DME Avionics) receives, processes and displays for the pilot the distance data provided by ground-based DMEs.

Enhanced Terminal Voice Switch (key system)

The Enhanced Terminal Voice Switches (ETVS) are installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) facilities with more than four air traffic controller positions. The ETVS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The ETVS (installed in the ATCT) provides the ATC operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the ETVS.

The ETVS (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within a TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the ETVS.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate ETVS systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Enhanced Traffic Management System (key system)

The Enhanced Traffic Management System (ETMS) application is at the heart of the Traffic Flow Management (TFM) system, and through it flows the network of all TFM interfaces. ETMS at the Command Center deals with the strategic flow of air traffic at the national level. ETMS at remote facilities is used for local airspace management within the local facility''s own area of responsibility. To facilitate coordination between the Traffic Management Coordinators (TMC) at remote Traffic Management Units (TMUs) and the Traffic Management Specialists (TMS) at the Air Traffic Control System Command Center (ARTSCC), each local ETMS may can also view the national composite picture of traffic for which the Command Center has responsibility. ETMS enables TMS and TMC personnel to track and predict traffic flows, analyze effects of ground delays or weather delays, evaluate alternative routing strategies, and plan traffic flow patterns.

The ETMS central hub is located at the Volpe National Transportation System Center. The hub collects flight schedules, and revisions, from NAS users, and collects actual traffic situation updates from local ETMS TMUs, and combines these with planned traffic initiatives (e.g., Ground Delay Programs) to generate an Aggregate Demand List (ADL) that is output to users every five (5) minutes. The ADL contains predicted arrival and departure traffic at individual airports. NAS users, e.g., air carriers, can access the ADL data to plan and revise their flight schedules to work more efficiently with planned traffic initiatives. This interactive process of flight planning gives users more input to TMCs on how traffic initiatives will affect them and is the heart of the Collaborative Decision Making (CDM) process.

Traffic Management Units (TMUs) are located throughout the NAS amd perform local flow control management functions. TMUs exist in all Air Route Traffic Control Centers (ARTCCs), 35 high activity Terminal Radar Approach Control (TRACONs), 8 Air Traffic Control Towers (ATCTs), 3 Center Radar Approach (CERAP) facilities, and the WJHTC. TMU hardware suites are automated workstations that include computer entry/readout devices, network communications, Flight Strip Printer (FSP), and a Traffic Situation Display (TSD).

NAS users are responsible for providing their own connectivity to the ETMS hub. The various connective user networks are collectively referred to as the CDM Network (CDMnet) which provides two-way connectivity to ETMS. Non-FAA users do not have access to all ETMS data and processing tools.

FAA Telecommunications Infrastructure

The FAA Telecommunications Infrastructure (FTI) services will replace most FAA-owned and leased telecommunications systems/services and consolidate their functions under a single service provider. The FTI contract will provide services that will meet current and future telecommunications requirements while reducing operational cost.

FTI is implemented in two phases. Phase 1 focuses on establishing an Internet Protocol (IP) backbone among 27 sites that includes ARTCCs, ATCSCC, Volpe, Aeronautical Center, WJHTC, and the two NADIN NNCC''s. Its primary goal is to transition 25 major nodes from the LINCS network. Phase 2 transitions circuits from DMN, BWM, NADIN PSN, and any remaining LINCS circuits.

FTI is a 15-year contract beginning in FY 2002 and ending in FY 2017.

Federal Telecommunications System 2001

Federal Telecommunications System 2001 (FTS 2001) provides for a follow-on lease for Federal Telecommunications System 2000 functions. The telecommunications service contract that will provide administrative and National Airspace

System (NAS) telecommunications support for the FAA. FTS 2001 will provide long distance voice, facsimile, video, and data services.

Fixed Position Surveillance Model 20 Series

The Fixed Position Surveillance Model 20 Series (FPS-20 Series) is a military primary radar of various models (FPS-20A, FPS-64, FPS-66A, FPS-67/A/B, and ARSR-60M) used by the FAA to detect slant range and azimuth of en route aircraft operating between terminals in the continental United States. Each of the different radar models is a similar variation of the original FPS-20 military radar.

Flight Data Input/Output (key system)

The Flight Data Input/Output (FDIO) system provides flight progress information for use by the Tower, Terminal Radar Approach Control (TRACON) and Air Route Traffic Control Center (ARTCC) controllers. The FDIO system allows Air Traffic Control (ATC) Specialists to input automated flight data, perform data manipulation, and print flight strips.

Flight Data Input/Output Modification (Technical Refresh)

The Flight Data Input/Output Modification (Technical Refresh) (FDIO Mod (Tech Refresh)) mechanism replaces components that are uneconomical to maintain in the system providing an interface between the air traffic controller (terminal or en route) and the center computer. FDIO provides flight plan data in printed form for Airport Traffic Control Tower (ATCT) and Terminal Radar Approach Control (TRACON) controllers.

Flight Management System

Flight Management System (FMS) is a computer system that uses a large database to allow routes to be preprogrammed and stored. The system is constantly updated with respect to position accuracy by reference to one or more conventional radio navigation aids (i.e., multi-sensor systems). The system may also use information from an inertial reference unit (IRU) or from a stand-alone inertial navigation system (INS). A sophisticated program and its associated database ensure that the most appropriate navaids are automatically selected during the update cycle. FMSs combine the relative position information from two or more point-referenced navigation aids such as VOR or DME to determine the absolute position of the aircraft (latitude, longitude). The resulting Area Navigation (RNAV) capability permits operation on any desired course.

Global Positioning System Avionics

Global Positioning System (GPS) Avionics process the signals received from four or more GPS satellites and determine the three-dimensional position (i.e., latitude, longitude and altitude) and velocity of an aircraft, as well as the precise time of day. GPS avionics provide an Area Navigation (RNAV) capability that permits operation on any desired course.

GPS avionics built to TSO-C129 do not have augmentation (WAAS, LAAS) and are approved only as a supplemental navigation system in the NAS, meaning that they must be used in conjunction with a primary navigation system. TSO-C129 avionics support en route and terminal area navigation, as well as non-precision instrument approach operations. Approval has been granted for properly certified GPS avionics to be used as a primary means of navigation in oceanic airspace and in certain remote areas. In certain regions of the world (including the NAS), GPS will be augmented (Wide Area and Local Area systems) to satisfy additional requirements for accuracy, coverage, availability, and integrity. Augmented GPS avionics (WAAS, LAAS) are expected to support precision instrument approach operations, and to gain approval as a primary navigation system throughout the NAS. It is anticipated that users will migrate from TSO-C129 avionics to augmented GPS avionics (WAAS, LAAS).

High Frequency Airborne Radios

High Frequency (HF) Airborne Radios are analog (HF multi-channel radio transceivers operating in the 2 - 30 Mhz frequency band installed in airborne commercial, cargo, and military aircraft transiting the oceanic, en route, terminal, or flight service station airspace domains. These transceivers are typically used in transoceanic applications.

Host Computer System

The Host Computer System (HCS) receives and processes surveillance reports, and flight plan information. The HCS sends search/beacon target, track and flight data, surveillance and alphanumeric weather information, time data, traffic management advisories and lists to the (Display System Replacement) DSR. The HCS associates surveillance-derived tracking information with flight-planning information. The DSR sends requests for flight data, flight data updates, and track control messages to the HCS. HCS-generated display orders are translated for use within the DSR workstation. While radar data processing is distributed among the terminal and En Route computer resources, the HCS performs virtually all of the flight data processing for its entire geographical area of responsibility. Every tower (ATCT) and terminal radar approach control (TRACON) relies exclusively on its parent HCS for flight data.

The HCS also runs algorithms that perform aircraft to aircraft (conflict alert) and aircraft to terrain (Minimum Safe Altitude Warning) separation assurance. The HCS algorithms provide visual and audible alerting to the controller when conflicts are identified.

The HCS presently supplies real time surveillance, flight data and other information to several decision support tools housed in collocated outboard processors connected via two-way high bandwidth links to the HCS and DSR. These are the (User Request Evaluation Tool, (URET), and the Traffic Management Advisory (TMA. URET performs probing of tentative flight plan changes to determine their viability. TMA provides sequencing and spacing information to align the aircraft in En Route airspace for approach.

Integrated Communications Switching System Type I

The Integrated Communications Switching System Type I (ICSS I) are installed at Airport Traffic Control Towers (ATCT), Terminal Radar Approach Control (TRACON) facilities, and Automated Flight Service Stations (AFSS).

The ICSS I (installed in the ATCT) provides the air traffic control (ATC) operational ground-ground voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/air traffic control system command center (ATCSCC) specialists. Ground-air radio connectivity between ATCT controllers and pilots is also supported by the ICSS I.

The ICSS I (installed in the TRACON) provides the ATC operational ground-ground voice communications interconnectivity between controllers within TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Ground-air radio connectivity between TRACON controllers and pilots is also supported by the ICSS I.

The ICSS I (installed in the AFSS) provides the ATC operational ground-ground voice communications interconnectivity between specialists within an AFSS (intercom), interconnectivity between specialists in separate AFSSs (interphone), and interconnectivity between Flight Service Station (FSS) specialists and Air Route Traffic Control Center (ARTCC) controllers/TRACON controllers/ATCT controllers/Air Traffic Control System Command Center (ATCSCC) specialists. Ground-air radio connectivity between AFSS specialists and pilots is also supported by the ICSS I.

Integrated Communications Switching System Type II

The Integrated Communications Switching System Type II (ICSS II) are installed at Airport Traffic Control Towers (ATCT), Automated Flight Service Stations(AFSS), and Terminal Radar Approach Control (TRACON) facilities.

The ICSS II (installed in the ATCT) provides the air traffic control (ATC) operational ground-ground voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Ground-air radio connectivity between ATCT controllers and pilots is also supported by the ICSS II.

The ICSS II (installed in the TRACON) provides the ATC operational ground-ground voice communications interconnectivity between controllers within TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC)) controllers/ Flight Service Station (FSS) specialists/air traffic control system command center (ATCSCC) specialists. Ground-air radio connectivity between TRACON controllers and pilots is also supported by the ICSS II.

Integrated Terminal Weather System

The Integrated Terminal Weather System (ITWS) functions as a weather server in the terminal domain. It acquires data from FAA and National Weather Service (NWS) sensors as well as from aircraft in flight in the terminal area. The ITWS will provide aviation-oriented weather products to Air Traffic Control (ATC) personnel that are immediately usable without further meteorological interpretation.

Integrated Terminal Weather System Display

The Integrated Terminal Weather System Display (ITWS Display) is used in the towers, Tower/Terminal Radar Approach Control (TRACONS), and en route facilities to depict weather that is impacting various ITWS airports.

Integrated Terminal Weather System Technological Refresh (TR)

The Integrated Terminal Weather System Technological Refresh (ITWS TR) provides a hardware/software upgrade for ITWS, enabling it to be sustained. Upgrades are implemented to the ITWS processor, the telecommunications module, with increases in RAM and the digital signal processor.

Interfacility Communications

The Interfacility Communications (Interfacility Comm) includes all ground-to-ground communications systems connecting FAA facilities.

Leased Inter-facility National Airspace System Communication System

The Leased Inter-facility National Airspace System Communication System (LINCS) provides transmission channels of various industry-standard types between any specified end points, used to satisfy all FAA operational and some administrative telecommunication requirements.

Loran-C Avionics

Loran-C Avionics receive, process, and display to the pilot the latitude and longitude of the aircraft""s current position, based on data received from ground-based equipment.

Loran-C is currently approved as a supplemental system in the NAS, meaning that it must be used in conjunction with a primary system. Current Loran-C avionics support en route and terminal area navigation but do not support instrument approach operations. System operation beyond 2008 depends upon analysis by FAA and USCG to ascertain ability to support aviation nonprecision approach operations and maritime harbor entrance & approach operations.

Low-Level Windshear Alert System - Model 2

The Low-Level Windshear Alert System Model-2 (LLWAS-2) is a system of wind sensors and processors that detect and identify hazardous low-level windshear and provides this information in real-time to the air traffic controller. The system is designed to warn of windshear hazardous to aircraft on approach to, and departure from airports. The LLWAS-2 consists of at least six (6) remote stations placed strategically around the airport, plus a centerfield station, and provides windshear information from various sections of the airport. The LLWAS-2 is being upgraded to the LLWAS-RS (relocation/Sustain with enhanced algorithms and locations to enhance its windshear detection performance for airport approach and departure corridors. At nine airports, the LLWAS-2 were converted to the LLWAS - Network Expansion (LLWAS-NE) in order to assist in detecting "dry" microbursts, particularly in the western U.S. and Rockies.

Low-Level Windshear Alert System - Network Expansion

The Low-Level Windshear Alert System - Network Expansion (LLWAS-NE) is a network of wind sensors (anemometers) and a processor that detects and identifies hazardous low-level windshear events and provides this information in real-time to the air traffic controller. The NE configuration is an upgraded LLWAS -2 designed to operate with the TDWR and complement its detection ability by detecting "dry microbursts" that occur frequently in the Rockies and western U.S. The LLWAS-NE consists of 6 to 32 wind sensors, which detect and report information related to a specific runway. LLWAS-NE also provides 3-mile approach and 2-mile departure windshear protection, and has remote monitoring capability. Additionally, LLWAS-NE has a more sophisticated windshear algorithm [than the LLWAS-2] allowing for improved detection capability.

Mode Select (key system)

The Mode Select (Mode S) mechanism is a ground-based system capable of selective interrogation of Mode S transponders and general interrogation of Air Traffic Control Radar Beacon System (ATCRBS) transponders within range. The system also receives, processes, and forwards the transponder replies to appropriate air traffic control (ATC) automation systems. Data formats for both interrogation and reply include data exchange capability.

The system also provides a Traffic Information Services (TIS) function that makes local traffic data available to the flight deck via the Mode S data link. TIS, a Mode S data link service, provides automatic traffic advisories to properly equipped aircraft. Pilots are able to request and receive a display of nearby traffic. The relative range, bearing, and altitude (if known) and a "proximate" or "threat" classification of nearby aircraft will be displayed in the cockpit.

Multi-Mode Digital Radios

Multi-Mode Digital Radios (MDRs) are ground-based Very High Frequency (VHF) air-traffic-control radios that can operate in several configurations: 1) analog voice with 25kHz channel spacing; 2) analog voice with 8.33 kHz channel spacing; and 3) VHF Data Link (VDL) Mode-3 which consists of two-way digital voice and data communication.

Multifunction Display System Avionics

A Multifunction Display System (Avionics) (MFDS Avionics) displays, by means of a cathode ray tube or flat panel, graphical and textual information, selectable by type. MFDS is capable of displaying both 2-D and 3-D ground maps, navigation data, and flight parameters. If an air-to-ground data link is present, the MFDS can display weather and traffic information.

Peripheral Adapter Module Replacement Item

The Peripheral Adapter Module Replacement Item (PAMRI) is an interface peripheral to the HOCSR. It provides a conduit through which the HOCSR receives and exchanges data, primarily radar data, flight data and interfacility data. The PAMRI converts communication protocols and translates data formats so the Host and EDARC can communicate with external devices.

Power Systems

The Power Systems (Pwr Sys) mechanism provides for the conditioning of commercial power, including uninterruptible power systems (UPS), to eliminate voltage dropouts, surges, and voltage sags caused by sources outside the facility. Power distribution, grounding, bonding and shielding of electrical system within the facility is also part of the Pwr Sys.

The Power Systems (Pwr Sys) mechanism provides the following: 1.) ACEPS Busway Replacements, 2.) ACEPS EG Maintenance, 3.) ACEPS Monitoring & Diagnostics, 4.) ACEPS Fuel System Upgrade, 5.) ACEPS Training, 6.) Battery Monitoring, 7.) Training Facility, 8.) CPDS, 9.) Battery Replacements, 10.) DC Systems, 11.) EG, 12.) LPGBS, 13.) Power Cable, 14.) UPS, 15.) Contract Support.

Precision Runway Monitor (key system)

The Precision Runway Monitor (PRM) is a secondary radar system, similar to the Mode Select (Mode S), which operates and updates targets at a faster rate than that of the normal Air Traffic Control Radar Beacon System (ATCRBS) or Mode S system. This faster update rate provides improved precision in predicting target positions. The PRM system is utilized to increase efficiency of operations during instrument meteorological conditions (IMC) by allowing independent simultaneous approaches to parallel runways spaced less than 4,300-feet apart. A separate display is located in the TRACON to support these parallel runway operations.

The PRM sensor (secondary radar) will undergo a Service Life Extension at the end of its current service life. The display function will eventually be incorporated into STARS.

Radio Communication Link

Radio Communication Link (RCL) is an integrated voice and data microwave transmission system designed to provide the FAA with cost effective and reliable service for its high capacity NAS communications routes. RCL interconnects air route traffic control center (ARTCC) facilities with long range radar installations and other air traffic control (ATC) facilities.

Rapid Deployment Voice Switch Type I (key system)

The Rapid Deployment Voice Switch Type I (RDVS I) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS I (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the RDVS I. The RDVS I (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the RDVS I.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS I systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Rapid Deployment Voice Switch Type II (key system)

The Rapid Deployment Voice Switch Type II (RDVS II) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS II (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the RDVS II. The RDVS II (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the RDVS II.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS II systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Rapid Deployment Voice Switch Type IIA (key system)

The Rapid Deployment Voice Switch Type IIA (RDVS IIA) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS IIA (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. The RDVS IIA also supports air-to-ground (A/G) radio connectivity between ATCT controllers and pilots. The RDVS IIA (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between TRACON controllers and pilots is also supported by the RDVS IIA.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS IIA systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Small Tower Voice Switch

The Small Tower Voice Switch (STVS) is installed in small Airport Traffic Control Towers (ATCT) and in Flight Service Stations (FSS). The basic STVS has four operator positions. The STVS provides the Air Traffic Control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and Air Route Traffic Control Center (ARTCC) controllers/ Terminal Radar Approach Control (TRACON) controllers/FSS specialists/air traffic control system command center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the STVS. The STVS (installed in the FSS) provides the ATC operational G/G voice communications interconnectivity between specialists within an FSS (intercom), interconnectivity between specialists in separate FSSs (interphone), and interconnectivity between FSS specialists and Air Route Traffic Control Center (ARTCC) controllers/Terminal Radar Approach Control (TRACON) controllers/ATCT controllers/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground radio connectivity between FSS specialists and pilots is also supported by the STVS.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate STVS systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Standard Terminal Automation Replacement System (key system)

The Standard Terminal Automation Replacement System (STARS) processes primary and secondary radar information to acquire and track data points to display aircraft position for controllers. STARS provides safety tools such as, conflict alert (CA), Mode C intruder (MCI), final monitoring aid (FMA), Minimum Safe Altitude Warning (MSAW), Converging Runway Display Aid (CARDA), and Controller Automated Spacing Aid (CASA). Also, STARS provides the capability to implement the following enhancements: improved radar processing, Global Positioning System (GPS) compatibility, adaptive routing, Center Terminal Radar Approach Control (TRACON) Automation System (CTAS), data link implementation, improved weather display, and better utilization of traffic management information.

Standard Terminal Automation Replacement System Early Display Configuration

The Standard Terminal Automation Replacement System, Early Display Configuration (STARS EDC) provides STARS workstations at a limited number of ARTS IIIA facilities to replace aging DEDS and provide validation of the STARS workstation design before the complete STARS is implemented. STARS EDC will include updates to ARTS software for life cycle maintenance, additional human-machine interface (HMI) requirements for both tower and Terminal Radar Approach Control (TRACON), and Automated Radar Terminal System Model IIIE (ARTS IIIE) human factors validation.

Standard Terminal Automation Replacement System Terminal Controller Workstation

The Standard Terminal Automation Replacement System Terminal Controller Workstation (STARS TCW) provides the interface between the Terminal Radar Approach Control (TRACON) controller and the STARS processing unit.

Sustain Air Route Traffic Control Center Facilities

The Sustain Air Route Traffic Control Center Facilities (Sustain ARTCC Facilities) mechanism replaces obsolete equipment and rehabilitates space in Air Route Traffic Control Center (ARTCC) facilities.

Systems Atlanta Information Display System

A Systems Atlanta Information Display System (SAIDS) enables users to collect and/or input, organize, format, update, disseminate, and display both static and real-time data regarding weather and other rapidly changing critical information to air traffic controllers and Air Traffic Control (ATC) supervisors/Managers. SAIDS is installed at Airport Traffic Control Towers (ATCT), Terminal Radar Approach Control (TRACON) facilities, Air Route Traffic Control Centers (ARTCC), regional offices, and Flight Service Station (FSS) facilities.

Ultra High Frequency Airborne Radios (key system)

The Ultra High Frequency Avionics (UHF Avionics) are analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225-400 MHz frequency band, which are multi-channel transceivers, installed in an airborne military platform. These airborne devices support the tactical two-way voice communications/ coordination between the military pilot in the military aircraft and the controller on the ground.

Ultra High Frequency Ground Radios (key system)

Ultra High Frequency (UHF) Ground Radios are analog UHF amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 Mhz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and flight service station domains.

Ultra High Frequency Ground Radios - Replacement

The Ultra High Frequency Ground Radios - Replacement (UHF Ground Radios - Repl) mechanism represents analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 MHz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and Flight Service Station domains.

Very High Frequency Airborne Radios (key system)

Very High Frequency (VHF) Airborne Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 Mhz frequency band which are multi-channel transceivers installed in an airborne platform (e.g., commercial, cargo, and general aviation aircraft). These airborne devices support the tactical two-way voice communications/coordination between the pilot in the aircraft and the controller on the ground.

Very High Frequency Data Link - 2 Avionics

Very High Frequency Data Link - 2 Avionics (VDL-2 Avionics) consist of airborne radios operating in the very high frequency (VHF) range that receive and transmit data using a low-speed, bit-oriented protocol and Carrier Sense Multiple Access (CSMA).

Very High Frequency Ground Radios (key system)

Very High Frequency (VHF) Ground Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 MHz frequency band which are single-channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the pilot in commercial, cargo, or general aviation aircraft in the oceanic, en route (i.e., ARTCC), terminal (i.e., TRACON/tower), and flight service station domains. Additionally, there are analog VHF frequency modulation (VHF - FM) radio devices operating in the 161 - 174 MHz frequency band that are multi-channel transceivers. These transceivers are used by flight inspection, aviation security, and airway facility specialists supporting local airport operations and maintenance or to perform their operational maintenance mission in support of the NAS. However, these same VHF-FM transceivers are also used to support the resolution of emergency situations or establish a level of voice command and control communications/coordination during disaster recovery.

Very High Frequency Multi-Mode Airborne Radios

Very High Frequency Multi-Mode Airborne Radios (VHF MM Airborne Radios) refers to an airborne radio operating in the very high frequency (VHF) range capable of operating in the following modes: (1)) analog voice (i.e., 25 kHz spacing for use in the United States and other similarly equipped countries); (2) VHF Digital Link Mode 2 (VDL Mode-2) (two-way digital data transmission); (3) VHF Digital Link Mode 3 (VDL Mode-3), (integrated two-way digital voice/data transmission); and (4) analog voice (i.e., 8.33 kHz spacing for use in Europe and other similarly equipped countries).

Very High Frequency Omnidirectional Range

The Very High Frequency Omnidirectional Range (VOR) is a ground-based radio navigation aid that broadcasts azimuth information to aircraft. VORs broadcast on assigned channels and include the facility identification in Morse code for pilot monitoring and verification. Some VORs are capable of broadcasting weather information and supporting pilot-controller communcations although these capabilities are typically provided by other infrastructure systems. In addition to providing en route and terminal area azimuth guidance, VORs also support nonprecision instrument approach operations.

Currently, VORs are the primary radio navigation aid in the National Airspace System (NAS). They serve as the internationally designated standard short-distance radio navigation aid for air carrier and general aviation Instrument Flight Rules (IFR) operations.

VORs may be installed stand-alone or co-located with either a DME or TACAN system. When co-located the facility is typically referred to as a VOR/DME or VORTAC facility, respectively. This configuration allows pilots to determine their aircraft''s bearing and distance to a single location, i.e., fix.

With the advent of space-based navigation capabilities, a planned reduction in operational VORs will begin in approximately 2010. The reduction will result in a "backbone" minimum operational network (MON) that will support IFR operations at the busiest airports in the NAS while serving as a backup for space-based navigation.

Very High Frequency Omnidirectional Range Avionics

Very High Frequency Omnidirectional Range Avionics (VOR Avionics) receive, process, and display for the pilot the azimuth (bearing) to or from ground-based VOR transmitters.

Increasing numbers of aircraft are being equipped with GPS or WAAS avionics. However, since a reduced network of VOR stations is planned to continue in operation indefinitely as a backup to GPS, VOR avionics are expected to remain in service indefinitely in some aircraft.

Voice Switching and Control System

The Voice Switching and Control System (VSCS) is installed in the Air Route Traffic Control Center (ARTCC). The VSCS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The VSCS provides the Air Traffic Control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ARTCC (intercom), interconnectivity between controllers in separate ARTCCs (interphone), and interconnectivity between ARTCC controllers and Terminal Radar Approach Control (TRACON) controllers/Airport Traffic Control Tower (ATCT) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ARTCC controllers and pilots is also supported by the VSCS.

Weather Avionics

The Weather Avionics (Wx Avionics) mechanism refers to devices that receive weather data in alphanumeric or graphical format from ground-based systems (e.g., Flight Information System (FIS), Terminal Weather Information for Pilots (TWIP)) and process it for display in the cockpit. The display may be a standalone unit or be integrated into a multifunction display (MFD).

Weather System Processor

The Weather System Processor (WSP) provides precipitation, windshear, microburst, and precipitation data at 39 terminal areas that require wind shear coverage but do not warrant a Terminal Doppler Weather Radar. WSP generates weather products (microburst detection, gust front detection, wind shift prediction, and precipitation detection and tracking) derived from additional processing of Airport Surveillance Radar-9 (ASR-9) weather data.

Weather Systems Processor Display

The Weather System Processor Displays (WSP Display) are located in the Air Traffic Control Tower (ATCT) and Terminal Radar Approach Control (TRACON) facilities and provide a graphic display of airport maps, airport specific runways and provides runway specific weather product alarms and alerts of wind shear, microbursts, and heavy precip to air traffic controllers.

People

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Planning Controller

A Planning Controller performs the following activities: Ensure separation; Initiate control instructions; Operate interphones; Conduct air/ground communications via data link; Coordinate tactical traffic flows; Scan flight data; Correlate with situation data; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the tactical controller when aware of those instructions.

Radar Associate Controller

A Radar Associate Controller performs the following activities: Ensure separation, initiate control instructions; operate interphones; Accept and initiate non-automated handoffs; and ensure radar controller is made aware of the actions; Assist the radar controller by accepting or initiating automated handoffs/pointouts which are necessary for the continued smooth operation of the sector, and ensure that the radar controller is made immediately aware of any action taken; Coordinate, including pointouts; Monitor radios when not performing higher priority duties; Scan flight progress strips; Correlate with radar data; Manage flight progress strips; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the radar controller when aware of those instructions.

Radar Controller

A Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate automated handoffs; Assist the radar associate controller with non-automated handoff actions when needed; Assist the radar associate controller in coordination when needed; Scan radar display; Correlate with flight progress strip information; Ensure computer entries are completed on instructions or clearances you issue or receive; Ensure strip marking is completed on instructions or clearances you issue or receive.

Tactical Controller

A Tactical Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios and data link; Oversee data link communications by the associate tactical controller; Accept and initiate automated handoffs; Assist the planning controller with non-automated handoff actions when needed; Assist the planning controller in coordination when needed; Scan the situation display; Correlate with flight data; Ensure computer entries are completed on instructions or clearances you issue or receive.

Traffic Management Specialist

Traffic Management Specialists perform the following activities: Balance air traffic demand with the airspace's capacity to maintain maximum and efficient utilization of the NAS; Coordinate and implement traffic management directives if needed for area of responsibility; Monitor and balance traffic flows within the area of responsibility in accordance with traffic management directives; Evaluate effectiveness of traffic management directives and make necessary adjustments; Document delay information.

Interfaces

Airport Surveillance Radar - Model 7 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIE

The ASR-7 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 7 — (Weather Data) ➔ Automated Radar Terminal System - Model IIE

The ASR-7 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 7 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIE

The ASR-7 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 7 — (Weather Data) ➔ Automated Radar Terminal System - Model IIIE

The ASR-7 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 7 — (Surveillance Data) ➔ Mode Select

The MODE S system correlates the primary radar returns with beacon data and transmits them to the automation system for tracking and display.

Airport Surveillance Radar - Model 8 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIE

The ASR-8 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 8 — (Weather Data) ➔ Automated Radar Terminal System - Model IIE

The ASR-8 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIE use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 8 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIA

The ASR-8 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIA for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 8 — (Weather Data) ➔ Automated Radar Terminal System - Model IIIA

The ASR-8 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIIA for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 8 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIE

The ASR-8 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 8 — (Weather Data) ➔ Automated Radar Terminal System - Model IIIE

The ASR-8 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 8 — (Surveillance Data) ➔ Mode Select

The MODE S system correlates the primary radar returns with beacon data via a Beacon Video Reconstitutor (BVR) and transmits them to the automation system for tracking and display.

Airport Surveillance Radar - Model 9 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIE

The ASR-9 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 9 — (Weather Data) ➔ Automated Radar Terminal System - Model IIE

The ASR terminal radar provides detected weather data to the ARTS for processing.

Airport Surveillance Radar - Model 9 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIA

The ASR-9 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIA for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 9 — (Weather Data) ➔ Automated Radar Terminal System - Model IIIA

The ASR terminal radar provides detected weather data to the ARTS for processing.

Airport Surveillance Radar - Model 9 — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIE

The ASR-9 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 9 — (Weather Data) ➔ Automated Radar Terminal System - Model IIIE

The ASR primary radar provides detected weather data to the ARTS for processing.

Airport Surveillance Radar - Model 9 — (Surveillance Data) ➔ Standard Terminal Automation Replacement System

The ASR-9 ground radar provides aircraft positional data (azimuth and slant range) to STARS for processing and use in controlling air traffic in the terminal domain.

Airport Surveillance Radar - Model 9 — (Weather Data) ➔ Standard Terminal Automation Replacement System

The ASR-9 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the STARS for processing and use in controlling air traffic in the terminal domain.

Automated Radar Terminal System - Model IIIA — (Track Data) ➔ Enhanced Traffic Management System

Automated Radar Terminal System - Model IIIA — (Surveillance Data) ➔ Precision Runway Monitor

The PRM receives messages containing ATC data that complements its surveillance data from the ARTS IIIA.

Automated Radar Terminal System - Model IIIE — (Track Data) ➔ Enhanced Traffic Management System

Enhanced Terminal Voice Switch ← (Voice Communication) ➔ Enhanced Terminal Voice Switch

This interface enables ATC voice communication between controllers in same or different facilities.

Enhanced Terminal Voice Switch ← (Voice Communication) ➔ Rapid Deployment Voice Switch Type I

This interface enables ATC voice communication between controllers in different facilities.

Enhanced Terminal Voice Switch ← (Voice Communication) ➔ Rapid Deployment Voice Switch Type II

This interface enables ATC voice communication between controllers in different facilities.

Enhanced Terminal Voice Switch ← (Voice Communication) ➔ Rapid Deployment Voice Switch Type IIA

This interface enables ATC voice communication between controllers in different facilities.

Enhanced Terminal Voice Switch ← (Voice Communication) ➔ Ultra High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Enhanced Terminal Voice Switch ← (Voice Communication) ➔ Very High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Enhanced Traffic Management System ← (Flight Data) ➔ Enhanced Traffic Management System

Enhanced Traffic Management System ← (Track Data) ➔ Enhanced Traffic Management System

Enhanced Traffic Management System ← (Weather Data) ➔ Enhanced Traffic Management System

Flight Data Input/Output ← (Flight Data) ➔ Flight Data Input/Output

The FDIOs in ARTCCs, TRACONs, ATCTs, and two Oceanic centers (New York and Oakland) exchange flight data with FDIOs in other ARTCCs, FDIOs TRACONs, ATCTs, and two Oceanic Centers (New York and Oakland).

Mode Select — (Surveillance Data) ➔ Airport Surveillance Radar - Model 9

The ASR-9 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports and then sends the data to an automation system for tracking and display.

Mode Select — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIE

The Mode S sends aircraft identification, position, and altitude to the ARTS IIE for processing and use in controlling air traffic in the terminal domain.

Mode Select — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIA

The Mode S sends aircraft identification, position, and altitude to the ARTS IIIA for processing and use in controlling air traffic in the terminal domain.

Mode Select — (Surveillance Data) ➔ Automated Radar Terminal System - Model IIIE

The Mode S sends aircraft identification, position, and altitude to the ARTS IIIE for processing and use in controlling air traffic in the terminal domain.

Mode Select — (Surveillance Data) ➔ Standard Terminal Automation Replacement System

The Mode S sends aircraft identification, position, and altitude to STARS for processing and use in controlling air traffic in the terminal domain.

Precision Runway Monitor — (Surveillance Data) ➔ Standard Terminal Automation Replacement System

The PRM provides highly accurate and rapidly updated azimuth data of aircraft to STARS for processing and use in controlling parallel approaches and landings.

Rapid Deployment Voice Switch Type I ← (Voice Communication) ➔ Rapid Deployment Voice Switch Type I

This interface enables ATC voice communication between controllers in same or different facilities.

Rapid Deployment Voice Switch Type I ← (Voice Communication) ➔ Rapid Deployment Voice Switch Type II

This interface enables ATC voice communication between controllers in different facilities.

Rapid Deployment Voice Switch Type I ← (Voice Communication) → Rapid Deployment Voice Switch Type IIA

This interface enables ATC voice communication between controllers in different facilities.

Rapid Deployment Voice Switch Type I ← (Voice Communication) → Ultra High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Rapid Deployment Voice Switch Type I ← (Voice Communication) → Very High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Rapid Deployment Voice Switch Type II ← (Voice Communication) → Rapid Deployment Voice Switch Type II

This interface enables ATC voice communication between controllers in same or different facilities.

Rapid Deployment Voice Switch Type II ← (Voice Communication) → Rapid Deployment Voice Switch Type IIA

This interface enables ATC voice communication between controllers in different facilities.

Rapid Deployment Voice Switch Type II ← (Voice Communication) → Ultra High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Rapid Deployment Voice Switch Type II ← (Voice Communication) → Very High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Rapid Deployment Voice Switch Type IIA ← (Voice Communication) → Rapid Deployment Voice Switch Type IIA

This interface enables ATC voice communication between controllers in same or different facilities.

Rapid Deployment Voice Switch Type IIA ← (Voice Communication) → Ultra High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Rapid Deployment Voice Switch Type IIA ← (Voice Communication) → Very High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Standard Terminal Automation Replacement System — (Track Data) → Enhanced Traffic Management System

Ultra High Frequency Ground Radios ← (Voice Communication) → Ultra High Frequency Airborne Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Very High Frequency Ground Radios ← (Voice Communication) → Very High Frequency Airborne Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Issues

None

Service Group Air Traffic Services

Service TM-Synchronization

Capability Airborne

Operational Improvement

Current Conflict Probe (104103)

Airborne spacing and sequencing of air traffic safely maximizes efficiency and capacity of the NAS during the en route phase of flight. Controllers provide traffic synchronization to en route aircraft by monitoring the situation, making control decisions, and modifying flight trajectories to meet operational objectives and accommodate user preferences. They achieve this by applying manual controller optimization procedures. Controllers using traffic displays and flight strip information integrate user preferences with separation requirements. They apply separation standards to achieve efficient use of navigable airspace.

01-Nov-2001 to 31-Jul-2008

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Conflict probe increases efficiency of airspace use in the en route domain. It assists in synchronization of en route traffic by identifying potential separation violations, both aircraft/aircraft and aircraft/airspace, early enough to avoid them. This results in better management and balance of the sector traffic capacity. Conflict probe also improves the ability of controllers to accommodate pilot requests for flight plan changes, thereby enabling the user to fly the most desirable route. This, in turn, reduces delays and costs to the user.

The radar associate controller is responsible for strategic identification and analysis of separation problems. Current conflict probe is a mental process carried out by the radar associate controller who analyzes the paper flight progress strips for the sector to detect potential conflicts. A series of flight progress strips is printed for the posting fixes along a flight's planned route in each sector, beginning approximately 30 minutes before the flight enters the facility's airspace. Additional flight progress strips for the sector are printed as the flight progresses to within the flight strip lead-time for subsequent sectors.

En route controllers now use a decision support tool called URET (User Request Evaluation Tool). The URET automatically predicts and notifies controllers of conflicts between aircraft or aircraft and special activity airspace. The system also allows controllers to quickly determine whether proposed flight path changes will conflict with en route traffic or airspace. By allowing controllers to evaluate route change requests and to assign conflict-free routing, the airspace users are able to save both time and fuel. URET capabilities include automatic conflict detection, and automated tools for solution trial planning and electronic flight data management.

When using the manual system, the radar associate controller coordinates with other sectors to determine the conflict status of aircraft entering and/or leaving his/her sector. In performing this function, the controller, using flight progress strips and the radar display, may calculate fixed radial distances, evaluate traffic flow direction based upon altitude, project where aircraft may cross, and correlate time. When necessary, the controller marks the flight progress strip with corrected or updated information. The Host Computer System (HCS) is updated to maintain coordination between the controllers' actions and the HCS flight database. In areas not covered by radar surveillance, controller analysis of the flight progress strips may provide the only available information on an aircraft's position and intent.

To determine which flight progress strips to provide to each sector, the radar associate controller divides the sector into non-overlapping volumes of airspace called Fix-Posting Areas (FPA). Each FPA has one posted fix defined within it either by a ground-based navigational aids or by the HCS, which is used to determine which flight progress strips should be provided to that sector. The strips are placed in the sector's strip board, grouped by posted fix, then arranged by time. The radar associate controller scans the time-sorted flight strips at various altitudes. Conflicts are predicted by the time proximity of flights at the same altitude at each posting fix. If a potential conflict is identified, the radar associate controller will mark the flight strip and may also verbally inform the radar controller of the situation. The radar controller is responsible for the tactical resolution of the potential conflict. Depending on the traffic situation, the radar controller may take immediate action to resolve the conflict or may allow the situation to develop before taking action. Conflict-resolution actions may include tactical maneuvers such as clearances for aircraft to vector off course to avoid each other. Conflict-resolution actions take precedence over accommodating user requests. In this way, the radar associate controller is performing a near continuous conflict probe on the aircraft in his/her sector.

In addition, the radar controller may receive a request from the pilot for a flight plan change. Assuming that the traffic situation in the sector will permit the request, the radar associate controller will analyze the pilot's request, using flight progress strips to determine if it will create a conflict situation with other traffic in the sector. He/she will then inform the radar controller of the results of the conflict analysis, who will take the appropriate action. In this way, the radar associate controller provides a what if conflict probe, a trial plan, in response to a user request.

The radar associate controller (or the radar controller in the absence of the radar associate controller) must know the structure of the airspace (airways, fixes, routes); airspace shape and boundaries, associated procedural requirements such as separation minima for that airspace; location of airports, navigational aids, special use airspace, aircraft performance characteristics to support conflict resolution; and so on. The controllers are supported by adaptations in the automation systems that provide situational awareness. For example, traffic is organized along various standard routes (primarily, though not exclusively, for arrivals and departures) that are defined in HCS adaptation. Fix postings are defined in HCS adaptation for each of these standard routes to enable the printing of the flight progress strips used in conflict probe. In addition, the HCS is adapted to display the airspace shape and boundaries of each sector and the locations of special use airspace to support conflict probing between aircraft and airspace.

Cruise conflict probe encompasses probe analysis on conflicts between aircraft and the following: (1) Other Aircraft: There is no automation support. A pilot request for a route change is more likely to be granted when the radar controller has the support of a radar associate controller to analyze the requested route and identify possible conflicts; (2) Airspace: same as "Other Aircraft," except that controllers use the HCS maps as displayed on the display system replacement (DSR) equipment, and use this same DSR equipment to access data on the current status of military operations areas or restricted areas; and (3) Weather: The pilot is responsible for separation from weather. Controllers will provide advisory information and strongly suggest that the flight use a different route.

Benefits

Current operations are provided in the NAS.

Systems

Air Route Surveillance Radar - Model 2 (key system)

The Air Route Surveillance Radar - Model 2 (ARSR-2) is a 1970s analog radar. It is a long-range radar system with a maximum detection range of 200 nm. The ARSR-2 is a surveillance system used to detect azimuth and slant range of en route aircraft operating between terminal areas. It also provides weather intensity data.

Air Route Surveillance Radar - Model 3 (key system)

The Air Route Surveillance Radar - Model 3 (ARSR-3) is a 1980s radar that provides primary long range surveillance data, including slant range and azimuth data. It processes the returns which includes demodulation, analog-to-digital conversion, moving target indicator function, sensitivity time control, range and azimuth gating, and digital target extraction - all of which are performed digitally (with the exception of the demodulation and analog-to-digital conversion). In addition, the ARSR-3 has a weather channel with associated processing to provide weather contour information in digital format.

Air Route Surveillance Radar - Model 4 (key system)

The Air Route Surveillance Radar - Model 4 (ARSR-4) is a three-dimensional, long-range, rotating phased array, primary surveillance radar with integrated height finder capability. It is part of the joint surveillance system (JSS) used in conjunction with ARSR-3 coverage as part of the nationwide air defense command surveillance network. In addition to functions peculiar to the military, the ARSR-4 performs the same basic functions of the ARSR-3, by providing primary long-range surveillance data, including slant range and azimuth data.

Air Traffic Control Beacon Interrogator - Model 4 (key system)

The Air Traffic Control Beacon Interrogator - Model 4 (ATCBI-4) is an air traffic control (ATC) beacon system that interrogates transponder-equipped aircraft. It is a secondary radar system that interrogates transponders, receives aircraft identification, and determines position data.

Air Traffic Control Beacon Interrogator - Model 5 (key system)

The Air Traffic Control Beacon Interrogator - Model 5 (ATCBI-5) is an air traffic control (ATC) beacon system that interrogates transponder-equipped aircraft. It is a secondary radar system that interrogates transponders, receives aircraft identification, and determines position data.

Air Traffic Control Beacon Interrogator - Model 6

The Air Traffic Control Beacon Interrogator Model 6 (ATCBI-6) is a ground-based system that interrogates transponders, receives and processes replies from transponders, determines the range and azimuth to the aircraft, and forwards the information to appropriate air traffic control (ATC) automation systems. Replies provide identification and altitude data of the transponder.

Automatic Direction Finder

Automatic Direction Finder (ADF) - An aircraft radio navigation system which senses and indicates the direction to a L/MF nondirectional radio beacon (NDB) ground transmitter. Direction is indicated to the pilot as a magnetic bearing or as a relative bearing to the longitudinal axis of the aircraft depending on the type of indicator installed in the aircraft. In certain applications, such as military, ADF operations may be based on airborne and ground transmitters in the VHF/UHF frequency spectrum.

Backup Emergency Communications

Back Up Emergency Communications (BUEC) provides a secondary A/G communications path for the en route environment, giving each controller access to another completely diverse radio channel. The original system, previously employed at all 20 CONUS ARTCCs, uses a limited number of tunable transceivers that are shared by a greater number of controllers through a priority system at the ARTCC.

The old BUEC is being replaced with dedicated BUEC channels on a one per sector basis to solve a serious supportability problem with the 30+-year-old system and to provide each controller with improved back up radio coverage. The new BUEC outlets have been sited for best coverage for the sectors"" service volumes that because of size require multiple RCAGs for coverage will have multiple BUEC sites. The program has no prime contractor. All activities including site selection, engineering, site preparation, transition, and testing are performed by the ANI and regional personnel. The Product Team provides equipment and funding for implementation. The new BUEC system employs the same equipment as the RCAGs.

Backup Emergency Communications Replacement

The Backup Emergency Communications (BUEC) Replacement (BUEC Repl) mechanism replaces existing analog BUEC system with an updated analoq BUEC system. Also provides backup for Remote Communications Air-Ground Facility (RCAG) very high frequency (VHF) and ultra high frequency (UHF) communications channels (radio equipment) that are available to an Air Route Traffic Control Center (ARTCC) for immediate use if one or more primary RCAG frequencies fail. The system consists of remotely controlled equipment, and several VHF and UHF transceivers. A typical BUEC system may provide as many as 60 VHF and UHF transceivers for an ARTCC.

Digital Voice Recorder System

Provides modern digital voice recording devices used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

In Feburary 2004, the DVRS was upgraded with a 24-channel card, which replaced the 16-channel card. This minor upgrade, called DVR II, was not extended to the systems installed prior to February 2004.

Direct Access Radar Channel

The Direct Access Radar Channel (DARC) provides a back-up processing path to provide surveillance data to the displays in the event of a primary channel (Host Computer System (HCS) failure. The DARC path is a physically, logically and electrically separate processing path (with diverse hardware and software) from the primary Host Computer System (HCS) Radar Data Processing (RDP) paths. Thus DARC provides a tertiary path, to keep radar data on the controller"s displays, should both HCS RDP paths be disabled for any reason. The DARC provides radar data processing, very limited flight data processing, but with significantly less functionality than the HCS. Basically, DARC serves as a lifeboat should both HCS processing paths become disabled.

Display System Replacement (key system)

The Display System Replacement (DSR) provides continuous real-time, automated support to air traffic controllers for the display of surveillance, flight data and other critical control information. This information is processed by the Host and Oceanic Computer System Replacement (HOCSR) and the Enhanced Direct Access Radar Channel (EDARC) subsystems. The DSR provides controller workstations, displays, and input/output devices and a communications infrastructure to connect the DSR with external processing elements of the en route ATC automation system.

Display System Replacement - R-position Technical Refresh

Display System Replacement R-position Technical Refresh (DSR R-posit Tech Refresh) replaces the processor and LAN infrastructure for the R-position in preparation for ERAM. The replacement display will provide full and equivalent functionality (flight and surveillance data) on both the primary and backup ERAM channels. The R-position display processor will have direct data exchange capability with each of the ERAM LAN attached processors, including the Surveillance Data Processor (SDP), Flight Data Processor (FDP), Conflict Probe Processor (CPP), Traffic Management Advisor (TMA), and Controller-Pilot Data Link Communications (CPDLC).

Display System Replacement Console Reconfiguration Monitor Replacement

Display System Replacement Console Reconfiguration Monitor Replacement (DSR CRMR) replaces the R-position cathode ray tube (CRT) with a 20 x 20-inch square flat panel liquid crystal displays (LCD). Replacement of the large CTR with a LCD will free up space in the rear of the DSR console for relocating Voice Switch Control System (VSCS) equipment. Relocating the VSCS Electronic Module (VEM) and the VSCS Training and Backup System (VTABS)--formerly known as VEM/PEM)--is part of this activity and will improve equipment efficiency, packaging and the productivity of maintenance personnel.

Distance Measuring Equipment

Distance Measuring Equipment (DME) is a UHF (Ultra High Frequency) ground-based radio navigation aid. DME avionics transmit interrogation pulses, and the ground-based responder sends a reply. The avionics process the reply and determine the slant range between the aircraft and the ground station. Separate funding segments and acquisition projects have been established for two generic classes of DME ground stations: High power (en route) DMEs, and low power (terminal) DMEs. This mechanism addresses the high power DMEs.

DMEs may be provided alone, but are more often collocated with a VOR to form a VOR/DME facility, allowing aircraft to determine both the bearing and slant range to the ground station - and hence a navigational position fix. DMEs are approved as a primary navigation system in the NAS. The DME function is frequently provided by the TACAN system that also provides azimuth guidance to military users. (DME and the distance-measuring portion of TACAN are functionally the same.) When combined with a VOR, these facilities are called VORTACs.

The DME network will be sustained to support en route navigation and to serve as an independent backup navigation source to GPS and GPS/WAAS. The DME network may also need to be expanded to provide a redundant area navigation (RNAV) capability for terminal area operations at major airports.

Distance Measuring Equipment Avionics

Distance Measuring Equipment Avionics (DME Avionics) receives, processes and displays for the pilot the distance data provided by ground-based DMEs.

En Route Communications Gateway

The En Route Communications Gateway (ECG) replaces PAMRI and provides a modernized LAN-based infrastructure capable of accommodating ERAM with minimal modifications. The PAMRI functions to be replaces include providing communications interfaces to external systems located in other ARTCCs, TRACONs, AFSSs, ATCSCC, NORAD, US Law Enforcement, US Customs, Military Base Operations, and international ACCs. Other interfaces include the FDIO Central Control Unit, which exchanges FDIO data with FAA and DOD facilities, and the NADIN Concentrator, which exchanges data through the NADIN PSN with the the M1FC via WMSCR. ECG increases the number of external interfaces to radars from 24 to 36. ECG provides internal interfaces between HCS and DARC (or EBUS) and between HCS and traffic flow processors such as ETMS and DSP. ECG includes a Monitor and Control subsystem and a display for monitoring up to two dozen radars--called the Random Access Plan Position Indicator (RAPPI).

The operational components of ECG consist of a front end processor (communications and surveillance interfaces), two gateway processors (internal connectivity to HCS and DARC/EBUS), and separate LANs that communicate between the front end and gateway processors on the primary channel and between the front end and gateway processors on the backup channel. The primary data path, consisting of the ECG primary gateway and the HCS, operate on separate hardware platforms. However, the backup data path, consisting of the ECG backup gateway and the EBUS, will operate on the same hardware platform--the ECG gateway platform. This processor, with both functions performed therein, is renamed to the Backup Interface Processor (BIP). In essence, a single processor operates on the backup channel, supporting both the ECG gateway function and the EBUS function. These two functions will remain, however, as two mechanisms in the NAS architecture.

FAA Telecommunications Infrastructure

The FAA Telecommunications Infrastructure (FTI) services will replace most FAA-owned and leased telecommunications systems/services and consolidate their functions under a single service provider. The FTI contract will provide services that will meet current and future telecommunications requirements while reducing operational cost.

FTI is implemented in two phases. Phase 1 focuses on establishing an Internet Protocol (IP) backbone among 27 sites that includes ARTCCs, ATCSCC, Volpe, Aeronautical Center, WJHTC, and the two NADIN NNCC''s. Its primary goal is to transition 25 major nodes from the LINCS network. Phase 2 transitions circuits from DMN, BWM, NADIN PSN, and any remaining LINCS circuits.

FTI is a 15-year contract beginning in FY 2002 and ending in FY 2017.

Federal Telecommunications System 2001

Federal Telecommunications System 2001 (FTS 2001) provides for a follow-on lease for Federal Telecommunications System 2000 functions. The telecommunications service contract that will provide administrative and National Airspace System (NAS) telecommunications support for the FAA. FTS 2001 will provide long distance voice, facsimile, video, and data services.

Flight Data Input/Output

The Flight Data Input/Output (FDIO) system provides flight progress information for use by the Tower, Terminal Radar Approach Control (TRACON) and Air Route Traffic Control Center (ARTCC) controllers. The FDIO system allows Air Traffic Control (ATC) Specialists to input automated flight data, perform data manipulation, and print flight strips.

Flight Management System

Flight Management System (FMS) is a computer system that uses a large database to allow routes to be preprogrammed and stored. The system is constantly updated with respect to position accuracy by reference to one or more conventional radio navigation aids (i.e., multi-sensor systems). The system may also use information from an inertial reference unit (IRU) or from a stand-alone inertial navigation system (INS). A sophisticated program and its associated database ensure that the most appropriate navaids are automatically selected during the update cycle. FMSs combine the relative position information from two or more point-referenced navigation aids such as VOR or DME to determine the absolute position of the aircraft (latitude, longitude). The resulting Area Navigation (RNAV) capability permits operation on any desired course.

Global Positioning System

The Global Positioning System (GPS) is a worldwide, all-weather, satellite-based navigation system developed, maintained & operated by the U.S Department of Defense, and managed by an Interagency executive board. GPS is a (nominal) 24 satellite constellation orbiting at approximately 12,000 miles above the earth in six planes. Each satellite broadcasts a precisely timed L-band signal on the same frequency. User GPS receivers, oboard aircraft, in ground vehicles or hand-held, receive and process the signals from all satellites in view, with a minimum of four satellites necessary to determine the receiver''s three-dimensional position (i.e., latitude, longitude and altitude), velocity (if applicable) and the precise time of day. GPS equipped aircraft can navigate on published jetways or utilize Area Navigation (RNAV) to fly any desired course between two locations.

GPS avionics built to TSO C-129 support en route and terminal area navigation, as well as non-precision instrument approach operations. Approval has been granted for properly certified GPS avionics to be used as a primary means of navigation in oceanic airspace and in certain remote areas. In July 2003 the Wide Area Augmentation System (WAAS)was commissioned to augment the GPS signal to meet primary navigation service requirements for accuracy, coverage, availability, and integrity.

Global Positioning System Avionics

Global Positioning System (GPS) Avionics process the signals received from four or more GPS satellites and determine the three-dimensional position (i.e., latitude, longitude and altitude) and velocity of an aircraft, as well as the precise time of day. GPS avionics provide an Area Navigation (RNAV) capability that permits operation on any desired course.

GPS avionics built to TSO-C129 do not have augmentation (WAAS, LAAS) and are approved only as a supplemental navigation system in the NAS, meaning that they must be used in conjunction with a primary navigation system. TSO-C129 avionics support en route and terminal area navigation, as well as non-precision instrument approach operations. Approval has been granted for properly certified GPS avionics to be used as a primary means of navigation in oceanic airspace and in certain remote areas. In certain regions of the world (including the NAS), GPS will be augmented (Wide Area and Local Area systems) to satisfy additional requirements for accuracy, coverage, availability, and integrity. Augmented GPS avionics (WAAS, LAAS) are expected to support precision instrument approach operations, and to gain approval as a primary navigation system throughout the NAS. It is anticipated that users will migrate from TSO-C129 avionics to augmented GPS avionics (WAAS, LAAS).

High Frequency Aeronautical Telecommunictions Network Data Link

The High Frequency Aeronautical Telecommunications Network Data Link (HF ATN DL) provides two-way digital data communications over HF radios using International Civil Aviation Organization (ICAO) - compliant ATN digital data link applications in the transoceanic domain.

The FAA has no plans to develop its own HF ATN Data Communications system.

High Frequency Airborne Radios

High Frequency (HF) Airborne Radios are analog (HF multi-channel radio transceivers operating in the 2 - 30 Mhz frequency band installed in airborne commercial, cargo, and military aircraft transiting the oceanic, en route, terminal, or flight service station airspace domains. These transceivers are typically used in transoceanic applications.

High Frequency Ground Radios

High Frequency (HF) Ground Radios are analog HF radio devices operating in the 2 - 30 Mhz frequency band, which may be single channel transmitters and receivers or multi-channel transceivers. These radio devices are installed at oceanic and en route facilities and used to support tactical air traffic control (ATC) voice communications between a ground controller and a pilot in an aircraft in the oceanic domain. Additionally, these devices are also installed at regional facilities and used to support voice command and control communications /coordination in emergency or during disaster recovery situations occurring in the NAS.

Host Computer System (key system)

The Host Computer System (HCS) receives and processes surveillance reports, and flight plan information. The HCS sends search/beacon target, track and flight data, surveillance and alphanumeric weather information, time data, traffic management advisories and lists to the (Display System Replacement) DSR. The HCS associates surveillance-derived tracking information with flight-planning information. The DSR sends requests for flight data, flight data updates, and track control messages to the HCS. HCS-generated display orders are translated for use within the DSR workstation. While radar data processing is distributed among the terminal and En Route computer resources, the HCS performs virtually all of the flight data processing for its entire geographical area of responsibility. Every tower (ATCT) and terminal radar approach control (TRACON) relies exclusively on its parent HCS for flight data.

The HCS also runs algorithms that perform aircraft to aircraft (conflict alert) and aircraft to terrain (Minimum Safe Altitude Warning) separation assurance. The HCS algorithms provide visual and audible alerting to the controller when conflicts are identified.

The HCS presently supplies real time surveillance, flight data and other information to several decision support tools housed in collocated outboard processors connected via two-way high bandwidth links to the HCS and DSR. These are the (User Request Evaluation Tool, (URET), and the Traffic Management Advisory (TMA. URET performs probing of tentative flight plan changes to determine their viability. TMA provides sequencing and spacing information to align the aircraft in En Route airspace for approach.

Inertial Navigation System Avionics

Inertial Navigation System Avionics (INS Avionics) is a self-contained system, comprised of gyroscopes, accelerometers, and a navigation computer, which provides navigation information in response to inertial effects on system components. An INS is typically aligned with accurate position information prior to departure, and thereafter calculates its position as it progresses to the destination. INS accuracy degrades with time, but can be aligned in flight using radio navigation system updates. Many inertial systems employ a sophisticated automatic update scheme using dual- Distance Measuring Equipment (DME), very high frequency (VHF) Omnidirectional Range VOR or other sensor inputs (e.g., Global Positioning System (GPS)).

INS may be approved as a primary navigation system or may be used in combination with other systems. By programming a series of waypoints, the system will navigate along a predetermined track. INS provides an Area Navigation (RNAV) capability that permits operation on any desired course.

Interfacility Communications

The Interfacility Communications (Interfacility Comm) includes all ground-to-ground communications systems connecting FAA facilities.

Leased Inter-facility National Airspace System Communication System

The Leased Inter-facility National Airspace System Communication System (LINCS) provides transmission channels of various industry-standard types between any specified end points, used to satisfy all FAA operational and some administrative telecommunication requirements.

Loran-C

Loran-C is a low frequency (LF), long-range, ground-based radionavigation aid operated by the U.S. Coast Guard. Loran-C avionics measure the time difference between signals received from three or more ground stations and determine the two-dimensional position (i.e., latitude and longitude) and velocity of the aircraft. Loran-C avionics provide an Area Navigation (RNAV) capability that permits operation on any desired course within the coverage area of the stations being used.

Loran-C is currently approved as a supplemental system in the National Airspace System (NAS), meaning that it must be used in conjunction with a primary system. Current Loran-C avionics support en route navigation but do not support instrument approach operations.

Operation of Loran-C beyond 2008 will be based upon a determination by the Department of Transportation and the Department of Homeland Security whether the system is needed as a backup to GPS for transportation and timing applications.

Loran-C Avionics

Loran-C Avionics receive, process, and display to the pilot the latitude and longitude of the aircraft""s current position, based on data received from ground-based equipment.

Loran-C is currently approved as a supplemental system in the NAS, meaning that it must be used in conjunction with a primary system. Current Loran-C avionics support en route and terminal area navigation but do not support instrument approach operations. System operation beyond 2008 depends upon analysis by FAA and USCG to ascertain ability to support aviation nonprecision approach operations and maritime harbor entrance & approach operations.

Low Power Distance Measuring Equipment

Distance Measuring Equipment (DME) is an Ultra High Frequency (UHF) ground-based radio-navigation aid. DME avionics reply to interrogations from the ground station, which is capable of processing replies from over 100 aircraft at one time. The DME determines the time between an interrogation and a reply to determine the slant range between them.

Acquisition projects have been established for two generic classes of DME ground stations: high power and low power. High power DMEs (HPDMEs)are rated at 1kw and are located to support enroute navigation. HPDMEs are typically co-located with VHF OmniRange systems, forming what is termed a VOR/DME facility. Low power DMEs (LPDMEs) are rated at 100w and are located to support terminal area navigation such as ILS approaches.

LPDMEs are installed with many ILS facilities. When specified in the ILS approach procedure, DME may be used in lieu of the outer marker, as a back-course final approach fix, or to establish other fixes on the localizer course. LPDMEs are also installed with some localizer-only (LOC) facilities. Additional LPDMEs are being installed to support ILS approaches as recommended by the Commercial Aviation Safety Team (CAST).

Mode Select

The Mode Select (Mode S) mechanism is a ground-based system capable of selective interrogation of Mode S transponders and general interrogation of Air Traffic Control Radar Beacon System (ATCRBS) transponders within range. The system also receives, processes, and forwards the transponder replies to appropriate air traffic control (ATC) automation systems. Data formats for both interrogation and reply include data exchange capability.

The system also provides a Traffic Information Services (TIS) function that makes local traffic data available to the flight deck via the Mode S data link. TIS, a Mode S data link service, provides automatic traffic advisories to properly equipped aircraft. Pilots are able to request and receive a display of nearby traffic. The relative range, bearing, and altitude (if known) and a "proximate" or "threat" classification of nearby aircraft will be displayed in the cockpit.

Multi-Mode Digital Radios

Multi-Mode Digital Radios (MDRs) are ground-based Very High Frequency (VHF) air-traffic-control radios that can operate in several configurations: 1) analog voice with 25kHz channel spacing; 2) analog voice with 8.33 kHz channel spacing; and 3) VHF Data Link (VDL) Mode-3 which consists of two-way digital voice and data communication.

National Airspace Data Interchange Network Message Switch Network

The National Airspace Data Interchange Network Message Switch Network (NADIN MSN) (sometimes called NADIN 1A) is an integrated store-and-forward telecommunications system consisting of message-switched networks, accessed by remote concentrators. NADIN MSN provides flight plan, weather, and Notice to Airmen (NOTAM) information, and meets the International Civil Aviation Organization (ICAO) requirements for Aeronautical Fixed Telecommunications Network (AFTN) support.

Peripheral Adapter Module Replacement Item (key system)

The Peripheral Adapter Module Replacement Item (PAMRI) is an interface peripheral to the HOCSR. It provides a conduit through which the HOCSR receives and exchanges data, primarily radar data, flight data and interfacility data. The PAMRI converts communication protocols and translates data formats so the Host and EDARC can communicate with external devices.

Power Systems

The Power Systems (Pwr Sys) mechanism provides for the conditioning of commercial power, including uninterruptible power systems (UPS), to eliminate voltage dropouts, surges, and voltage sags caused by sources outside the facility. Power distribution, grounding, bonding and shielding of electrical system within the facility is also part of the Pwr Sys.

The Power Systems (Pwr Sys) mechanism provides the following: 1.) ACEPS Busway Replacements, 2.) ACEPS EG Maintenance, 3.) ACEPS Monitoring & Diagnostics, 4.) ACEPS Fuel System Upgrade, 5.) ACEPS Training, 6.) Battery Monitoring, 7.) Training Facility, 8.) CPDS, 9.) Battery Replacements, 10.) DC Systems, 11.) EG, 12.) LPGBS, 13.) Power Cable, 14.) UPS, 15.) Contract Support.

Radio Communication Link

Radio Communication Link (RCL) is an integrated voice and data microwave transmission system designed to provide the FAA with cost effective and reliable service for its high capacity NAS communications routes. RCL interconnects air route traffic control center (ARTCC) facilities with long range radar installations and other air traffic control (ATC) facilities.

Radio Control Equipment

Radio Control Equipment (RCE), located at both ATC facilities and remote communication sites, control the operation of remotely located ground to air Very High Frequency/Ultra High Frequency (VHF/UHF) radios used by air traffic controllers to communicate with pilots. RCE interfaces with the voice switch at the ATC facility, telephone landlines, and ground to air radios at the En Route Remote Communications Air/Ground (RCAG) sites, Terminal Remote Transmitter/Receiver (RTR) sites, and Flight Service Station Remote Communications Outlet (RCO) sites.

Sustain Air Route Traffic Control Center Facilities

The Sustain Air Route Traffic Control Center Facilities (Sustain ARTCC Facilities) mechanism replaces obsolete equipment and rehabilitates space in Air Route Traffic Control Center (ARTCC) facilities.

Tactical Air Navigation System

Tactical Air Navigation (TACAN) is a UHF (ultra high frequency) ground-based radio navigation aid that is the military counterpart of VHF Omnidirectional Range co-located with Distance Measuring Equipment (VOR/DME). TACAN avionics provide both the bearing and slant range to the ground station - and hence a navigation position fix. TACAN is often collocated with civil VOR systems to form a VORTAC to support military aircraft operations. TACAN is approved as a primary navigation system in the National Airspace System (NAS).

Ultra High Frequency Airborne Radios (key system)

The Ultra High Frequency Avionics (UHF Avionics) are analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225-400 MHz frequency band, which are multi-channel transceivers, installed in an airborne military platform. These airborne devices support the tactical two-way voice communications/ coordination between the military pilot in the military aircraft and the controller on the ground.

Ultra High Frequency Ground Radios (key system)

Ultra High Frequency (UHF) Ground Radios are analog UHF amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 Mhz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and flight service station domains.

Ultra High Frequency Ground Radios - Replacement

The Ultra High Frequency Ground Radios - Replacement (UHF Ground Radios - Repl) mechanism represents analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 MHz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and Flight Service Station domains.

User Request Evaluation Tool Core Capability Limited Deployment (key system)

The User Request Evaluation Tool Core Capability Limited Deployment (URET CCLD) provides conflict probe capabilities to the data controller display in Air Route Traffic Control Center (ARTCC) facilities. URET combines real-time flight plan and radar track data with site adaptation, aircraft performance characteristics, and winds and temperatures aloft to construct four dimensional flight profiles, or trajectories, for pre-departure and active flights. For active flights, it also adapts itself to the observed behavior of the aircraft, dynamically adjusting predicted speeds, climb rates, and descent rates based on the performance of each individual flight as it is tracked through en route airspace, all to maintain aircraft trajectories to get the best possible prediction of future aircraft positions. URET uses its predicted trajectories to continuously detect potential aircraft conflicts up to 20 minutes into the future and to provide strategic notification to the appropriate sector. URET enables controllers to "look ahead" for potential conflicts through "what if" trial planning of possible flight path amendments. It enables controllers to accommodate user-preferred, off-airway routing to enable aircraft to fly more efficient routes, which reduce time and fuel consumption.

URET CCLD communicates with the controller at the DSR D-position by means of a gateway to the DSR LAN. It obtains flight plan and track data from Host by direct connection, and it obtains wind, temperature and pressure data from WARP WINS by means of a gateway. URET CCLD is deployed to 6 sites and will be expanded to 20 under URET National Deployment (FFP2).

User Request Evaluation Tool National Deployment

The User Request Evaluation Tool National Deployment (URET National Deployment) provides conflict probe capabilities to the data controller display in the Air Route Traffic Control Centers (ARTCC) facilities. URET combines real-time flight plan and radar track data with site adaptation, aircraft performance characteristics, and winds and temperatures aloft to construct four dimensional flight profiles, or trajectories, for pre-departure and active flights. For active flights, it also adapts itself to the observed behavior of the aircraft, dynamically adjusting predicted speeds, climb rates, and descent rates based on the performance of each individual flight as it is tracked through en route airspace, all to maintain aircraft trajectories to get the best possible prediction of future aircraft positions. URET uses its predicted trajectories to continuously detect potential aircraft conflicts up to 20 minutes into the future and to provide strategic notification to the appropriate sector. URET enables controllers to "look ahead" for potential conflicts through "what if" trial planning of possible flight path amendments. It enables controllers to accommodate user-preferred, off-airway routing to enable aircraft to fly more efficient routes, which reduce time and fuel consumption.

The National Deployment deployment of URET adds systems to the remaining ARTCCs and tech refreshes the original systems fielded under URET CCLD. The tech refresh provides additional functionalities. It will also introduce infrastructure changes to synchronize with DSR D-side infrastructure changes (see the DSR Mod (Tech Refresh) mechanism), both of which are driven by future ERAM infrastructure changes. New URET functions include: Alternate Flight Plan Processing; Automatic Assistance Dynamic Rerouting; ICAO flight plan processing; Problem Analysis, Resolution and Ranking; Airspace Redesign; and Tech Refresh. ERAM will replace the URET Fiber Distributed Data Interface (FDDI) LAN infrastructure, the URET Conflict Probe processor, and add a redundant Conflict Probe backup capability.

Very High Frequency Airborne Radios (key system)

Very High Frequency (VHF) Airborne Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 Mhz frequency band which are multi-channel transceivers installed in an airborne platform (e.g., commercial, cargo, and general aviation aircraft). These airborne devices support the tactical two-way voice communications/coordination between the pilot in the aircraft and the controller on the ground.

Very High Frequency Data Link - 2 Avionics

Very High Frequency Data Link - 2 Avionics (VDL-2 Avionics) consist of airborne radios operating in the very high frequency (VHF) range that receive and transmit data using a low-speed, bit-oriented protocol and Carrier Sense Multiple Access (CSMA).

Very High Frequency Ground Radios (key system)

Very High Frequency (VHF) Ground Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 MHz frequency band which are single-channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the pilot in commercial, cargo, or general aviation aircraft in the oceanic, en route (i.e., ARTCC), terminal (i.e., TRACON/tower), and flight service station domains. Additionally, there are analog VHF frequency modulation (VHF - FM) radio devices operating in the 161 - 174 MHz frequency band that are multi-channel transceivers. These transceivers are used by flight inspection, aviation security, and airway facility specialists supporting local airport operations and maintenance or to perform their operational maintenance mission in support of the NAS. However, these same VHF-FM transceivers are also used to support the resolution of emergency situations or establish a level of voice command and control communications/coordination during disaster recovery.

Very High Frequency Multi-Mode Airborne Radios

Very High Frequency Multi-Mode Airborne Radios (VHF MM Airborne Radios) refers to an airborne radio operating in the very high frequency (VHF) range capable of operating in the following modes: (1)) analog voice (i.e., 25 kHz spacing for use in the United States and other similarly equipped countries); (2) VHF Digital Link Mode 2 (VDL Mode-2) (two-way digital data transmission); (3) VHF Digital Link Mode 3 (VDL Mode-3), (integrated two-way digital voice/data transmission); and (4) analog voice (i.e., 8.33 kHz spacing for use in Europe and other similarly equipped countries).

Very High Frequency Omnidirectional Range

The Very High Frequency Omnidirectional Range (VOR) is a ground-based radio navigation aid that broadcasts azimuth information to aircraft. VORs broadcast on assigned channels and include the facility identification in Morse code for pilot monitoring and verification. Some VORs are capable of broadcasting weather information and supporting pilot-controller communcations although these capabilities are typically provided by other infrastructure systems. In addition to providing en route and terminal area azimuth guidance, VORs also support nonprecision instrument approach operations.

Currently, VORs are the primary radio navigation aid in the National Airspace System (NAS). They serve as the internationally designated standard short-distance radio navigation aid for air carrier and general aviation Instrument Flight Rules (IFR) operations.

VORs may be installed stand-alone or co-located with either a DME or TACAN system. When co-located the facility is typically referred to as a VOR/DME or VORTAC facility, respectively. This configuration allows pilots to determine their aircraft"s bearing and distance to a single location, i.e., fix.

With the advent of space-based navigation capabilities, a planned reduction in operational VORs will begin in approximately 2010. The reduction will result in a "backbone" minimum operational network (MON) that will support IFR operations at the busiest airports in the NAS while serving as a backup for space-based navigation.

Very High Frequency Omnidirectional Range Avionics

Very High Frequency Omnidirectional Range Avionics (VOR Avionics) receive, process, and display for the pilot the azimuth (bearing) to or from ground-based VOR transmitters.

Increasing numbers of aircraft are being equipped with GPS or WAAS avionics. However, since a reduced network of VOR stations is planned to continue in operation indefinitely as a backup to GPS, VOR avionics are expected to remain in service indefinitely in some aircraft.

Voice Switching and Control System (key system)

The Voice Switching and Control System (VSCS) is installed in the Air Route Traffic Control Center (ARTCC). The VSCS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The VSCS provides the Air Traffic Control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ARTCC (intercom), interconnectivity between controllers in separate ARTCCs (interphone), and interconnectivity between ARTCC controllers and Terminal Radar Approach Control (TRACON) controllers/Airport Traffic Control Tower (ATCT) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ARTCC controllers and pilots is also supported by the VSCS.

Voice Switching and Control System Modification (Control System Upgrade)

The VSCS control system upgrade (VCSU) is a replacement of the Tandem computers that perform the logical switching and control for the VSCS system. The replacement of Tandem computers is for all ARTCCs including three spares.

Voice Switching and Control System Modification (Technological Refresh)

The Tech Refresh for VSCS is a service life extension. The Tech Refresh encompasses workstation upgrade, video display monitor, control equipment power, VSCU supportability, control shelf power supply, and software development demonstration system expansion.

Voice Switching and Control System Training and Backup Switches

Voice Switching and Control System Training and Backup Switch (VTABS) was developed to meet AT requirements for a separate standalone VSCS Backup and Training System. VTABS can be configured as a 50-position switch with the capability to support air traffic operations in the event of VSCS failure, hardware and software maintenance or power loss.

WAAS Corrections Broadcast Service

WAAS Corrections Broadcast Service is comprised of both Space-based and Ground Earth Station components.

Geostationary Earth Orbit (GEO) satellites receive Wide Area Augmentation System (WAAS) correction and integrity information transmitted by Ground Earth Stations (in WAAS terms referred to as Ground Uplink Stations (GUSs)) with information re-broadcast for WAAS avionics reception and use. Current broadcast service leased from INMARSAT".

Wide Area Augmentation System

The Wide Area Augmentation System (WAAS) consists of a distributed array of Reference and Master Stations designed to provide range correction and integrity information messages that are used by WAAS-capable Global Positioning System (GPS)avionics to accurately determine an aircraft"s 3-dimensional position in space. Accurately surveyed WAAS Reference Stations (WRS) receive and process GPS satellite range data which is forwarded to redundant WAAS Master Stations (WMS) for additional processing before sending the resulting range-correction data to redundant WAAS Ground Uplink Stations (GUS). The GUS transmit the data to Geostationary (GEO) satellites which retransmit them on a GPS civil-use frequency for reception by GPS/WAAS avionics. The WAAS data enables aircraft to determine their position in the airspace with an accuracy that will enable, for WAAS-equipped aircraft, introduction of advanced navigation initiatives such as precision and non-precision approaches to airports throughout the NAS, and reduced longitudinal separation.

The WAAS service volume includes the contiguous United States, Hawaii, portions of Alaska and the Caribbean, and the US border areas with Canada and Mexico. Planned enhancement of WAAS with additional WRS and GEO satellites will improve the coverage and availability of WAAS. Enhancement of the GPS by the Department of Defense (DoD) will provide a second civil frequency for WAAS that will provide additional improvements in navigation performance throughout the NAS. This latter version of the WAAS will be termed the GPS Landing System (GLS).

Wide Area Augmentation System Technology Refresh

Elements of WAAS technical refresh consist of two paths. One is improvement to operational capability that enhances performance of WAAS. The other is the known replacement of equipment, including hardware, software, and telecommunications links and networks within the WAAS WMS and GUS.

Technical refresh is subject to "re-baselining" activity that is currently underway and the FAA will make a corporate decision in September 2004.

People

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Planning Controller

A Planning Controller performs the following activities: Ensure separation; Initiate control instructions; Operate interphones; Conduct air/ground communications via data link; Coordinate tactical traffic flows; Scan flight data; Correlate with situation data; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the tactical controller when aware of those instructions.

Radar Associate Controller

A Radar Associate Controller performs the following activities: Ensure separation, initiate control instructions; operate interphones; Accept and initiate non-automated handoffs; and ensure radar controller is made aware of the actions; Assist the radar controller by accepting or initiating automated handoffs/pointouts which are necessary for the continued smooth operation of the sector, and ensure that the radar controller is made immediately aware of any action taken; Coordinate, including pointouts; Monitor radios when not performing higher priority duties; Scan flight progress strips; Correlate with radar data; Manage flight progress strips; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the radar controller when aware of those instructions.

Radar Controller

A Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate automated handoffs; Assist the radar associate controller with non-automated handoff actions when needed; Assist the radar associate controller in coordination when needed; Scan radar display; Correlate with flight progress strip information; Ensure computer entries are completed on instructions or clearances you issue or receive; Ensure strip marking is completed on instructions or clearances you issue or receive.

Tactical Controller

A Tactical Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios and data link; Oversee data link communications by the associate tactical controller; Accept and initiate automated handoffs; Assist the planning controller with non-automated handoff actions when needed; Assist the planning controller in coordination when needed; Scan the situation display; Correlate with flight data; Ensure computer entries are completed on instructions or clearances you issue or receive.

Traffic Management Specialist

Traffic Management Specialists perform the following activities: Balance air traffic demand with the airspace's capacity to maintain maximum and efficient utilization of the NAS; Coordinate and implement traffic management directives if needed for area of responsibility; Monitor and balance traffic flows within the area of responsibility in accordance with traffic management directives; Evaluate effectiveness of traffic management directives and make necessary adjustments; Document delay information.

Interfaces

Air Route Surveillance Radar - Model 2 — (Surveillance Data) → Peripheral Adapter Module Replacement Item

The ARSR-2 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the PAMRI interface, which then routes the data to the HCS and DARC for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 2 — (Weather Data) → Peripheral Adapter Module Replacement Item

The ARSR-2 long-range radar provides detected weather data to the PAMRI for processing at en route facilities.

Air Route Surveillance Radar - Model 3 — (Surveillance Data) → Peripheral Adapter Module Replacement Item

The ARSR-3 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the PAMRI interface, which then routes the data to the HCS and DARC for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 3 — (Weather Data) → Peripheral Adapter Module Replacement Item

The ARSR-3 long-range radar provides detected weather data to the PAMRI for processing at en route facilities.

Air Route Surveillance Radar - Model 4 — (Surveillance Data) → Peripheral Adapter Module Replacement Item

The ARSR-4 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the PAMRI interface, which then routes the data to the HCS and DARC for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 4 — (Weather Data) → Peripheral Adapter Module Replacement Item

The ARSR-4 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the PAMRI for processing and use in controlling air traffic in the en route domain.

Air Traffic Control Beacon Interrogator - Model 4 — (Surveillance Data) → Air Route Surveillance Radar - Model 2

The ARSR-2 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports via a CD-2, which sends the data to an automation system for tracking and display.

Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) → Air Route Surveillance Radar - Model 2

The ARSR-2 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports via a CD-2, which sends the data to an automation system for tracking and display.

Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) → Air Route Surveillance Radar - Model 3

The ARSR-3 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports and then sends the data to an automation system for tracking and display.

Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) → Air Route Surveillance Radar - Model 4

The ARSR-4 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports and then sends the data to an automation system for tracking and display.

Display System Replacement ← (Flight Data) → User Request Evaluation Tool Core Capability Limited Deployment

D-position

Host Computer System ← (Flight Data) → Display System Replacement

The HCS sends flight data, time data, traffic management advisories to the DSR display and sends flight plans to the Flight Strip Printer. HCS receives flight plan amendments from ATC via entries on the R-position DSR.

Host Computer System ← (Track Data) → Display System Replacement

The HCS sends target fixes and track data to DSR and receives re-assignment of surveillance to sectors from ATCs as needed. (Note: the type of data passed to DSR is not raw surveillance data but rather is Target (fixes) and track (series of fixes) data produced by the HCS RDP.

Host Computer System — (Weather Data) → Display System Replacement

The HCS sends alphanumeric weather data to the DSR. Note: This is different from weather graphics, which is displayed on the DSR D-position from WARP.

Host Computer System — (Flight Data) → User Request Evaluation Tool Core Capability Limited Deployment

The HCS sends flight data to URET for 20 minute look ahead in conflict probe processing.

Host Computer System — (Track Data) → User Request Evaluation Tool Core Capability Limited Deployment

The HCS sends track data to URET for 20 minute look ahead in conflict probe processing.

Peripheral Adapter Module Replacement Item — (Flight Data) → Host Computer System

The PAMRI is a conduit through which the HCS receives and exchanges flight data with remote FDIO flight strip printer system (printer/display/keyboard) as well as with external automation systems such as ARTS/STARS (TRACON), ODAPS/FDP2000 (Ocean), and FSM (ATCSCC). FDIO uses the General Purpose Input/Output (GPI/O) parallel interfaces and automation systems use the Interfacility Communications Input/Output (INTI/O) serial interfaces.

Peripheral Adapter Module Replacement Item — (Surveillance Data) → Host Computer System

The PAMRI passes surveillance data from the primary/secondary radars to the HCS for processing and use in controlling aircraft.

Peripheral Adapter Module Replacement Item — (Flight Data) → Peripheral Adapter Module Replacement Item

The PAMRI passes flight data between ARTCCs.

Peripheral Adapter Module Replacement Item — (Track Data) → Peripheral Adapter Module Replacement Item

The PAMRI passes track data between ARTCCs.

Ultra High Frequency Ground Radios ← (Voice Communication) → Ultra High Frequency Airborne Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

User Request Evaluation Tool Core Capability Limited Deployment ← (Flight Data) → User Request Evaluation Tool Core Capability Limited Deployment

User Request Evaluation Tool Core Capability Limited Deployment ← (Track Data) → User Request Evaluation Tool Core Capability Limited Deployment

Very High Frequency Ground Radios ← (Voice Communication) → Very High Frequency Airborne Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Voice Switching and Control System ← (Voice Communication) → Ultra High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Voice Switching and Control System ← (Voice Communication) → Very High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Voice Switching and Control System ← (Voice Communication) → Voice Switching and Control System

This interface enables ATC voice communication between controllers in same or different facilities.

Issues

none identified

Service Group Air Traffic Services

Service TM-Synchronization

Capability Airborne

Operational Improvement

Current Oceanic Conflict Probe (104101)

Airborne spacing and sequencing of air traffic safely maximizes efficiency and capacity of the oceanic airspace. Controllers provide traffic synchronization to aircraft during oceanic flight by monitoring the situation, making control decisions, and modifying flight trajectories to meet operational objectives and accommodate user preferences. They achieve this by applying manual controller optimization procedures. Controllers use flight strip information with an initial decision support to integrate user preferences with separation requirements. They apply separation standards to achieve efficient use of navigable airspace.

29-Sep-1999 to 30-Dec-2015

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

The Federal Aviation Administration provides oceanic air traffic services to aircraft flying within specific flight information regions (FIR). These regions include a portion of the western half of the North Atlantic Ocean, much of the Caribbean region, a large portion of the Arctic Ocean, and a major portion of the Pacific Ocean. The New York and Oakland Oceanic centers are responsible for oceanic airspace, while the Anchorage Air Route Traffic Control Center provides en route and oceanic air traffic services for all Alaskan airspace. The Oceanic Air Traffic Control (ATC) systems at New York and Oakland provide air traffic services in areas outside of radar coverage. Operations are performed through procedural separation using paper flight strips. Air-to-ground communication is indirect through a third party, high frequency (HF) radio operator and multi sector oceanic data link (MSODL). Surveillance is not possible over most of the ocean. Therefore, aircraft report their positions to oceanic ATC at prescribed intervals or locations as they progress along their flight paths. Navigation is performed principally with onboard inertial navigation systems (INS) or Global Positioning Systems and communication by HF voice and data link. To allow for INS errors and communications uncertainties (e.g., atmospheric disturbances, indirect voice relayed through a third party, and language problems), current oceanic horizontal separation minima are very large. Intensive coordination is required to ensure accurate communications between FIRs via teletype, telephone, or Air Traffic Services Interfacility Data Communications.

In the New York and Oakland centers, the Oceanic Display and Planning System (ODAPS) provides a situation display of controlled aircraft estimated positions in oceanic airspace. These positions are based on the extrapolation of filed flight plan data (used by the Airline Operations Center using conventional and Dynamic Aircraft Route Planning systems) and are updated by periodic HF voice position reports, position reports via Oceanic Data Link from Future Air Navigation System 1/A-equipped aircraft or controller input. ODAPS also supports a procedural conflict probe capability. Controllers use the ODAPS interim situation display (ISD) for planning and situational awareness. The ISD does not provide the controller decision support tools required for it to be the primary means for procedural separation.

The ODAPS sites are currently using MSODL as the air traffic control communications interface tool between the controller and the pilot. MSODL enables each sector controller to retain and search through ODAPS messages and messages received from the ARINC radio operators. MSODL enables direct pilot-controller communications using data link and a pilot-to-HF radio operator data link. The oceanic workstations include an ISD, a flight strip printer and flight strip bay, and an MSODL/Flight Information Display workstation. Information received via voice must be manually input into the computer by the controller. Most information that is sent or received via data link automatically updates the ODAPS.

The conflict probe reduces the potential for a separation violation in procedural airspace and improves efficiency of air traffic services. It also reduces the need for flight plan amendments to avoid a violation of separation standards. The Oceanic conflict probe is a flight plan-based strategic conflict detection tool available to the ODAPS sector controller for aircraft flying in non radar areas. It notifies the controller if two targets are predicted to have less than minimum separation within a parameter time or if a predicted aircraft track will enter restricted airspace. The conflict probe may be initiated by an Oceanic controller□s manual request; a site-specific time parameter; automatically for simple data link clearances; and by changes known to the ODAPS as potentially impacting relative aircraft positions, such as a cleared flight plan amendment. The current positions and the predicted paths of the aircraft must be extrapolated from flight plan data, infrequent aircraft position reports, and upper-wind data models. The Oceanic controller enters the probe request into ODAPS, and the oceanic conflict probe algorithm extrapolates a flight plan forward in time. The oceanic controller reviews the results to see if there is any violation of separation standards between the flight plan and the other flight plans in the flight plan database. Advanced Technology and Oceanic Procedures (ATOP) will provide data link, automatic dependent surveillance (ADS) - broadcast and ADS - addressable, conflict probe, and electronic flight progress strips, as well as other important features.

Benefits

Current operations are provided in the NAS.

Systems

Advanced Technologies and Oceanic Procedures

Advanced Technologies and Oceanic Procedures (ATOP) is a Non-Developmental Item (NDI) automation, communications, training, maintenance, installation, transition, and procedures development support acquisition. It will provide a Flight Data Processing (FDP) capability fully integrated with Surveillance Data Processing (SDP). The SDP will be capable of processing primary and secondary radar, Automatic Dependent Surveillance (ADS, both Addressable: ADS-A and Broadcast: ADS-B), Controller Pilot Data Link Communications (CPDLC) position reports, and relayed High Frequency (HF) radio voice pilot position reports from an HF radio operator employed by a communications service provider under contract to the FAA. ATOP will support radar and non-radar procedural separation, tracking clearances issued via CPDLC or messages through the HF radio service provider, conflict detection/prediction capabilities through the use of controller tools (Conflict Alert and Minimum Safe Altitude Warning for radar airspace and Conflict Probe for non-radar procedural separation applications), and fully automated coordination via Air traffic services Inter-facility Data Communications System (AIDCS) with AIDCS equipped adjacent Flight Information Regions (FIRs) . The ATOP inter-facility data communications system will be capable of supporting the ICAO air traffic services message set. ATOP supports operations in which the information and primary capabilities required for the controller to maintain situational awareness and provide procedural separation services are available on the display (rather than paper flight strips).

Advanced Technologies and Oceanic Procedures Controller Work Station

The Advanced Technologies and Oceanic Procedures Controller Work Station (ATOP Controller WS). The ATOP Controller Workstation is part of a non-developmental item (NDI) automation, training, maintenance, installation, transition, and procedures development support acquisition. The workstation will interface with the integrated Flight Data Processing (FDP). The workstation will contain displays for information from primary and secondary radar, Automatic Dependent Surveillance (ADS), Controller Pilot Data Link Communications (CPDLC) position reports, and relayed pilot reports from High Frequency (HF) voice service provider. The ATOP workstation will support radar and non-radar procedural separation, tracking clearances issued via CPDLC or messages through the HF radio service provider, conflict detection/prediction capabilities through the use of controller tools, and coordination via Air Traffic Services Interfacility Data Communications System (AIDCS). Additionally, it is expected to support operations in which the information and primary capabilities required for the controller to maintain situational awareness and provide procedural separation services are available on the display (rather than paper flight strips).

Air Traffic Control Beacon Interrogator - Model 6

The Air Traffic Control Beacon Interrogator Model 6 (ATCBI-6) is a ground-based system that interrogates transponders, receives and processes replies from transponders, determines the range and azimuth to the aircraft, and forwards the information to appropriate air traffic control (ATC) automation systems. Replies provide identification and altitude data of the transponder.

Automatic Direction Finder

Automatic Direction Finder (ADF) - An aircraft radio navigation system which senses and indicates the direction to a L/MF nondirectional radio beacon (NDB) ground transmitter. Direction is indicated to the pilot as a magnetic bearing or as a relative bearing to the longitudinal axis of the aircraft depending on the type of indicator installed in the aircraft. In certain applications, such as military, ADF operations may be based on airborne and ground transmitters in the VHF/UHF frequency spectrum.

Backup Emergency Communications

Back Up Emergency Communications (BUEC) provides a secondary A/G communications path for the en route environment, giving each controller access to another completely diverse radio channel. The original system, previously employed at all 20 CONUS ARTCCs, uses a limited number of tunable transceivers that are shared by a greater number of controllers through a priority system at the ARTCC.

The old BUEC is being replaced with dedicated BUEC channels on a one per sector basis to solve a serious supportability problem with the 30+-year-old system and to provide each controller with improved back up radio coverage. The new

BUEC outlets have been sited for best coverage for the sectors"" service volumes that because of size require multiple RCAGs for coverage will have multiple BUEC sites. The program has no prime contractor. All activities including site selection, engineering, site preparation, transition, and testing are performed by the ANI and regional personnel. The Product Team provides equipment and funding for implementation. The new BUEC system employs the same equipment as the RCAGs.

Backup Emergency Communications Replacement

The Backup Emergency Communications (BUEC) Replacement (BUEC Repl) mechanism replaces existing analog BUEC system with an updated analoq BUEC system. Also provides backup for Remote Communications Air-Ground Facility (RCAG) very high frequency (VHF) and ultra high frequency (UHF) communications channels (radio equipment) that are available to an Air Route Traffic Control Center (ARTCC) for immediate use if one or more primary RCAG frequencies fail. The system consists of remotely controlled equipment, and several VHF and UHF transceivers. A typical BUEC system may provide as many as 60 VHF and UHF transceivers for an ARTCC.

Digital Voice Recorder System

Provides modern digital voice recording devices used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

In Feburary 2004, the DVRS was upgraded with a 24-channel card, which replaced the 16-channel card. This minor upgrade, called DVR II, was not extended to the systems installed prior to February 2004.

Direct Access Radar Channel

The Direct Access Radar Channel (DARC) provides a back-up processing path to provide surveillance data to the displays in the event of a primary channel (Host Computer System (HCS) failure. The DARC path is a physically, logically and electrically separate processing path (with diverse hardware and software) from the primary Host Computer System (HCS) Radar Data Processing (RDP) paths. Thus DARC provides a tertiary path, to keep radar data on the controller"s displays, should both HCS RDP paths be disabled for any reason. The DARC provides radar data processing, very limited flight data processing, but with significantly less functionality than the HCS. Basically, DARC serves as a lifeboat should both HCS processing paths become disabled.

Display System Replacement

The Display System Replacement (DSR) provides continuous real-time, automated support to air traffic controllers for the display of surveillance, flight data and other critical control information. This information is processed by the Host and Oceanic Computer System Replacement (HOCSR) and the Enhanced Direct Access Radar Channel (EDARC) subsystems. The DSR provides controller workstations, displays, and input/output devices and a communications infrastructure to connect the DSR with external processing elements of the en route ATC automation system.

Distance Measuring Equipment

Distance Measuring Equipment (DME) is a UHF (Ultra High Frequency) ground-based radio navigation aid. DME avionics transmit interrogation pulses, and the ground-based responder sends a reply. The avionics process the reply and determine the slant range between the aircraft and the ground station. Separate funding segments and acquisition projects have been established for two generic classes of DME ground stations: High power (en route) DMEs, and low power (terminal) DMEs. This mechanism addresses the high power DMEs.

DMEs may be provided alone, but are more often collocated with a VOR to form a VOR/DME facility, allowing aircraft to determine both the bearing and slant range to the ground station - and hence a navigational position fix. DMEs are approved as a primary navigation system in the NAS. The DME function is frequently provided by the TACAN system that also provides azimuth guidance to military users. (DME and the distance-measuring portion of TACAN are functionally the same.) When combined with a VOR, these facilities are called VORTACs.

The DME network will be sustained to support en route navigation and to serve as an independent backup navigation source to GPS and GPS/WAAS. The DME network may also need to be expanded to provide a redundant area navigation (RNAV) capability for terminal area operations at major airports.

Distance Measuring Equipment Avionics

Distance Measuring Equipment Avionics (DME Avionics) receives, processes and displays for the pilot the distance data provided by ground-based DMEs.

Dynamic Ocean Tracking System Plus (key system)

The Dynamic Ocean Tracking System Plus (DOTS Plus) automation system is located in each of the three Oceanic ARTCCs (Anchorage, Oakland, and New York) and in the ATCSCC. DOTS permits airlines to save fuel by flying random routes, in contrast to structured routes, and permit the air traffic controller to achieve lateral spacing requirements more efficiently. DOTS generates flexible oceanic tracks that are optimized for best airspace utilization and best time/fuel efficiency. Flexible tracks are updated twice a day using forecast winds aloft and separation (vertical and lateral) requirements. The DOTS oceanic traffic display gives a visual presentation of tracks and weather. DOTS sends traffic advisories and track advisories to users and receives aircraft progress reports from the commercial communications service providers. These external data exchanges are achieved through interfaces with the National Airspace Data Interchange Network (NADIN) Packet Switch Network (PSN) for Position Reports, Air Traffic Management (ATM) messages, Pilot Reports (PIREPS), and the Anchorage FDP2000. An interface to the Enhanced Traffic Flow Management System (ETMS) will improve coordination between the oceanic and domestic Traffic Flow Management (TFM) systems/activities. The DOTS Weather Server, installed at the Air Traffic Control System Command Center (ATCSCC), receives National Weather Service (NWS) wind and temperature data via the WARP/WINS system. The weather data is then distributed to the ARTCCs via commercially provided Integrated Services Digital Network (ISDN) telephone lines. DOTS Plus supports separation reduction initiatives as stipulated in RNP-10 (Required Navigation Performance) for decreasing lateral separation from 100 nautical miles to 50 nautical miles.

En Route Communications Gateway

The En Route Communications Gateway (ECG) replaces PAMRI and provides a modernized LAN-based infrastructure capable of accommodating ERAM with minimal modifications. The PAMRI functions to be replaces include providing communications interfaces to external systems located in other ARTCCs, TRACONs, AFSSs, ATCSCC, NORAD, US Law Enforcement, US Customs, Military Base Operations, and international ACCs. Other interfaces include the FDIO Central

Control Unit, which exchanges FDIO data with FAA and DOD facilities, and the NADIN Concentrator, which exchanges data through the NADIN PSN with the the M1FC via WMSCR. ECG increases the number of external interfaces to radars from 24 to 36. ECG provides internal interfaces between HCS and DARC (or EBUS) and between HCS and traffic flow processors such as ETMS and DSP. ECG includes a Monitor and Control subsystem and a display for monitoring up to two dozen radars--called the Random Access Plan Position Indicator (RAPPI).

The operational components of ECG consist of a front end processor (communications and surveillance interfaces), two gateway processors (internal connectivity to HCS and DARC/EBUS), and separate LANs that communicate between the front end and gateway processors on the primary channel and between the front end and gateway processors on the backup channel. The primary data path, consisting of the ECG primary gateway and the HCS, operate on separate hardware platforms. However, the backup data path, consisting of the ECG backup gateway and the EBUS, will operate on the same hardware platform--the ECG gateway platform. This processor, with both functions performed therein, is renamed to the Backup Interface Processor (BIP). In essence, a single processor operates on the backup channel, supporting both the ECG gateway function and the EBUS function. These two functions will remain, however, as two mechanisms in the NAS architecture.

FAA Telecommunications Infrastructure

The FAA Telecommunications Infrastructure (FTI) services will replace most FAA-owned and leased telecommunications systems/services and consolidate their functions under a single service provider. The FTI contract will provide services that will meet current and future telecommunications requirements while reducing operational cost.

FTI is implemented in two phases. Phase 1 focuses on establishing an Internet Protocol (IP) backbone among 27 sites that includes ARTCCs, ATCSCC, Volpe, Aeronautical Center, WJHTC, and the two NADIN NNCC''s. Its primary goal is to transition 25 major nodes from the LINCS network. Phase 2 transitions circuits from DMN, BWM, NADIN PSN, and any remaining LINCS circuits.

FTI is a 15-year contract beginning in FY 2002 and ending in FY 2017.

Federal Telecommunications System 2001

Federal Telecommunications System 2001 (FTS 2001) provides for a follow-on lease for Federal Telecommunications System 2000 functions. The telecommunications service contract that will provide administrative and National Airspace System (NAS) telecommunications support for the FAA. FTS 2001 will provide long distance voice, facsimile, video, and data services.

Flight Data Input/Output (key system)

The Flight Data Input/Output (FDIO) system provides flight progress information for use by the Tower, Terminal Radar Approach Control (TRACON) and Air Route Traffic Control Center (ARTCC) controllers. The FDIO system allows Air Traffic Control (ATC) Specialists to input automated flight data, perform data manipulation, and print flight strips.

Flight Data Input/Output Modification (Technical Refresh)

The Flight Data Input/Output Modification (Technical Refresh) (FDIO Mod (Tech Refresh)) mechanism replaces components that are uneconomical to maintain in the system providing an interface between the air traffic controller (terminal or en route) and the center computer. FDIO provides flight plan data in printed form for Airport Traffic Control Tower (ATCT) and Terminal Radar Approach Control (TRACON) controllers.

Flight Data Processing 2000

The Flight Data Processing 2000 (FDP2000) system replaced the oceanic flight data processing capability provided by Offshore Computer System (OCS) at the Anchorage Air Route Traffic Control Center (ARTCC). FDP2000 provides new hardware and software with added capabilities. The added capabilities include winds aloft modeling for improved aircraft position extrapolation accuracy, and support of Air Traffic Services Inter-facility Data Communications Systems (AIDC) ground-to-ground data link with compatible Flight Information Regions (FIRs). The OCS software was re-hosted from the Hewlett-Packard (HP) 1000 platform to the HP 9000 platform. FDP2000 provides flight data to the Microprocessor-En Route Automated Radar Tracking System (Micro-EARTS) radar data processing system. FDP2000 also integrates the existing Controller Pilot Data Link Communications (CPDLC) functions for data link communications with Future Air Navigation System 1/A (FANS 1/A)-equipped aircraft.

Flight Management System

Flight Management System (FMS) is a computer system that uses a large database to allow routes to be preprogrammed and stored. The system is constantly updated with respect to position accuracy by reference to one or more conventional radio navigation aids (i.e., multi-sensor systems). The system may also use information from an inertial reference unit (IRU) or from a stand-alone inertial navigation system (INS). A sophisticated program and its associated database ensure that the most appropriate navaids are automatically selected during the update cycle. FMSs combine the relative position information from two or more point-referenced navigation aids such as VOR or DME to determine the absolute position of the aircraft (latitude, longitude). The resulting Area Navigation (RNAV) capability permits operation on any desired course.

Future Air Navigation System 1/A (key system)

The Future Air Navigation System (FANS) is based on the International Civil Aviation Organization□s (ICAO) concept of a phased approach to implementing a modern, satellite-based, global Communication, Navigation, Surveillance/ Air Traffic Management (CNS/ATM) system. The following aircraft avionics are required to support an initial FANS implementation. These functions are referred to as FANS-1; the French developed equivalent for the Airbus A-330/340 is called FANS-A: Automatic Dependent Surveillance (ADS), ATC Data link, Airline Operational Control Data Link, Global Positioning System (GPS.

The FANS operational environment extends beyond the aircraft to include satellite, ground-based receiver/transmit stations, and a controller/pilot datalink system.

FANS 1/A consists of three message applications: AFN (ATS Facility Notification for logon to ATC via data link), ADS (Automatic Dependent Surveillance), CPDLC (Controller Pilot Data Link Communications). FANS 1/A uses the existing ACARS air/ground network to carry data link messages to/from the aircraft.

FANS 1 (Boeing implementation) was first certified in June of 1995 for use in the South Pacific. Oakland, Fiji, Aukland, and Brisbane FIRs were the initial participants for CPDLC using Inmarsat satcom. The latter three FIRs also used ADS for surveillance.

"The OEP identifies the ATOP program for implementation of FANS 1/A in Oakland, Anchorage and NY FIRs beginning in 2003." There are approximately 1000 FANS 1/A equipped aircraft in service as of mid-2002. All long-range model commercial transport aircraft have FANS 1 or FANS A either as standard equipment or as an option. In oceanic and remote areas, where FANS 1/A is currently in use, the Inmarsat geosynchronous satellite constellation provides the air/ground data link. HF data link will undergo trials as a FANS 1/A air/ground data link in late 2002-2003.

Global Positioning System

The Global Positioning System (GPS) is a worldwide, all-weather, satellite-based navigation system developed, maintained & operated by the U.S Department of Defense, and managed by an Interagency executive board. GPS is a (nominal) 24 satellite constellation orbiting at approximately 12,000 miles above the earth in six planes. Each satellite broadcasts a precisely timed L-band signal on the same frequency. User GPS receivers, oboard aircraft, in ground vehicles or hand-held, receive and process the signals from all satellites in view, with a minimum of four satellites necessary to determine the receiver''s three-dimensional position (i.e., latitude, longitude and altitude), velocity (if applicable) and the precise time of day. GPS equipped aircraft can navigate on published jetways or utilize Area Navigation (RNAV) to fly any desired course between two locations.

GPS avionics built to TSO C-129 support en route and terminal area navigation, as well as non-precision instrument approach operations. Approval has been granted for properly certified GPS avionics to be used as a primary means of navigation in oceanic airspace and in certain remote areas. In July 2003 the Wide Area Augmentation System (WAAS)was commissioned to augment the GPS signal to meet primary navigation service requirements for accuracy, coverage, availability, and integrity.

Global Positioning System Avionics

Global Positioning System (GPS) Avionics process the signals received from four or more GPS satellites and determine the three-dimensional position (i.e., latitude, longitude and altitude) and velocity of an aircraft, as well as the precise time of day. GPS avionics provide an Area Navigation (RNAV) capability that permits operation on any desired course.

GPS avionics built to TSO-C129 do not have augmentation (WAAS, LAAS) and are approved only as a supplemental navigation system in the NAS, meaning that they must be used in conjunction with a primary navigation system. TSO-C129 avionics support en route and terminal area navigation, as well as non-precision instrument approach operations. Approval has been granted for properly certified GPS avionics to be used as a primary means of navigation in oceanic airspace and in certain remote areas. In certain regions of the world (including the NAS), GPS will be augmented (Wide Area and Local Area systems) to satisfy additional requirements for accuracy, coverage, availability, and integrity. Augmented GPS avionics (WAAS, LAAS) are expected to support precision instrument approach operations, and to gain approval as a primary navigation system throughout the NAS. It is anticipated that users will migrate from TSO-C129 avionics to augmented GPS avionics (WAAS, LAAS).

High Frequency Aeronautical Telecommunictions Network Data Link

The High Frequency Aeronautical Telecommunications Network Data Link (HF ATN DL) provides two-way digital data communications over HF radios using International Civil Aviation Organization (ICAO) - compliant ATN digital data link applications in the transoceanic domain.

The FAA has no plans to develop its own HF ATN Data Communications system.

High Frequency Airborne Radios

High Frequency (HF) Airborne Radios are analog (HF multi-channel radio transceivers operating in the 2 - 30 Mhz frequency band installed in airborne commercial, cargo, and military aircraft transiting the oceanic, en route, terminal, or flight service station airspace domains. These transceivers are typically used in transoceanic applications.

High Frequency Ground Radios

High Frequency (HF) Ground Radios are analog HF radio devices operating in the 2 - 30 Mhz frequency band, which may be single channel transmitters and receivers or multi-channel transceivers. These radio devices are installed at oceanic and en route facilities and used to support tactical air traffic control (ATC) voice communications between a ground controller and a pilot in an aircraft in the oceanic domain. Additionally, these devices are also installed at regional facilities and used to support voice command and control communications /coordination in emergency or during disaster recovery situations occurring in the NAS.

Host Computer System

The Host Computer System (HCS) receives and processes surveillance reports, and flight plan information. The HCS sends search/beacon target, track and flight data, surveillance and alphanumeric weather information, time data, traffic management advisories and lists to the (Display System Replacement) DSR. The HCS associates surveillance-derived tracking information with flight-planning information. The DSR sends requests for flight data, flight data updates, and track control messages to the HCS. HCS-generated display orders are translated for use within the DSR workstation. While radar data processing is distributed among the terminal and En Route computer resources, the HCS performs virtually all of the flight data processing for its entire geographical area of responsibility. Every tower (ATCT) and terminal radar approach control (TRACON) relies exclusively on its parent HCS for flight data.

The HCS also runs algorithms that perform aircraft to aircraft (conflict alert) and aircraft to terrain (Minimum Safe Altitude Warning) separation assurance. The HCS algorithms provide visual and audible alerting to the controller when conflicts are identified.

The HCS presently supplies real time surveillance, flight data and other information to several decision support tools housed in collocated outboard processors connected via two-way high bandwidth links to the HCS and DSR. These are the (User Request Evaluation Tool, (URET), and the Traffic Management Advisory (TMA. URET performs probing of tentative flight plan changes to determine their viability. TMA provides sequencing and spacing information to align the aircraft in En Route airspace for approach.

Inertial Navigation System Avionics

Inertial Navigation System Avionics (INS Avionics) is a self-contained system, comprised of gyroscopes, accelerometers, and a navigation computer, which provides navigation information in response to inertial effects on system components. An INS is typically aligned with accurate position information prior to departure, and thereafter calculates its position as it progresses to the destination. INS accuracy degrades with time, but can be aligned in flight using radio navigation system updates. Many inertial systems employ a sophisticated automatic update scheme using dual- Distance Measuring Equipment (DME), very high frequency (VHF) Omnidirectional Range VOR or other sensor inputs (e.g., Global Positioning System (GPS)).

INS may be approved as a primary navigation system or may be used in combination with other systems. By programming a series of waypoints, the system will navigate along a predetermined track. INS provides an Area Navigation (RNAV) capability that permits operation on any desired course.

Leased Inter-facility National Airspace System Communication System

The Leased Inter-facility National Airspace System Communication System (LINCS) provides transmission channels of various industry-standard types between any specified end points, used to satisfy all FAA operational and some administrative telecommunication requirements.

Loran-C

Loran-C is a low frequency (LF), long-range, ground-based radionavigation aid operated by the U.S. Coast Guard. Loran-C avionics measure the time difference between signals received from three or more ground stations and determine the two-dimensional position (i.e., latitude and longitude) and velocity of the aircraft. Loran-C avionics provide an Area Navigation (RNAV) capability that permits operation on any desired course within the coverage area of the stations being used.

Loran-C is currently approved as a supplemental system in the National Airspace System (NAS), meaning that it must be used in conjunction with a primary system. Current Loran-C avionics support en route navigation but do not support instrument approach operations.

Operation of Loran-C beyond 2008 will be based upon a determination by the Department of Transportation and the Department of Homeland Security whether the system is needed as a backup to GPS for transportation and timing applications.

Loran-C Avionics

Loran-C Avionics receive, process, and display to the pilot the latitude and longitude of the aircraft""s current position, based on data received from ground-based equipment.

Loran-C is currently approved as a supplemental system in the NAS, meaning that it must be used in conjunction with a primary system. Current Loran-C avionics support en route and terminal area navigation but do not support instrument approach operations. System operation beyond 2008 depends upon analysis by FAA and USCG to ascertain ability to support aviation nonprecision approach operations and maritime harbor entrance & approach operations.

Microprocessor-En Route Automated Radar Tracking System (key system)

The Microprocessor-En Route Automated Radar Tracking System (Micro-EARTS) is a radar processing system implemented with Commercial Off-the-Shelf (COTS) equipment, for use in both En Route and Terminal environments. It provides single sensor and a mosaic display of traffic and weather using long- and short-range radars. At Anchorage, Alaska, Micro-EARTS also provides Automatic Dependent Surveillance-Broadcast (ADS-B) surveillance and display. Micro-EARTS interfaces with multiple types of displays, including Display System Replacement (DSR), Digital Bright Radar Indicator Tower Equipment (DBRITE), and the flat panel tower controller displays.

Mode Select

The Mode Select (Mode S) mechanism is a ground-based system capable of selective interrogation of Mode S transponders and general interrogation of Air Traffic Control Radar Beacon System (ATCRBS) transponders within range. The system also receives, processes, and forwards the transponder replies to appropriate air traffic control (ATC) automation systems. Data formats for both interrogation and reply include data exchange capability.

The system also provides a Traffic Information Services (TIS) function that makes local traffic data available to the flight deck via the Mode S data link. TIS, a Mode S data link service, provides automatic traffic advisories to properly equipped aircraft. Pilots are able to request and receive a display of nearby traffic. The relative range, bearing, and altitude (if known) and a "proximate" or "threat" classification of nearby aircraft will be displayed in the cockpit.

Multi-Mode Digital Radios

Multi-Mode Digital Radios (MDRs) are ground-based Very High Frequency (VHF) air-traffic-control radios that can operate in several configurations: 1) analog voice with 25kHz channel spacing; 2) analog voice with 8.33 kHz channel spacing; and 3) VHF Data Link (VDL) Mode-3 which consists of two-way digital voice and data communication.

Multi-Sector Oceanic Data Link (key system)

Multi-sector Oceanic Data Link System (MSODL) supports air-ground data link communications and extends single sector data link functionality to all Oceanic Display and Planning System (ODAPS) sector positions. Oceanic Data Link (ODL) gives controllers two-way electronic communications with aircraft equipped with data link. The technology is designed to reduce/eliminate the need for voice communication thus improving the reliability and timeliness of message delivery. The ODL provides a means to automatically check pending clearances for conflicts, while enabling flight crews automatically to load flight clearances into the Flight Management System (FMS). The ODL also gives controllers an integrated interface with the flight data processor (FDP). It also addresses problems with the existing high-frequency (HF) communications with aircraft, such as frequency congestion, transcription errors and lack of timeliness.

National Airspace Data Interchange Network Message Switch Network

The National Airspace Data Interchange Network Message Switch Network (NADIN MSN) (sometimes called NADIN 1A) is an integrated store-and-forward telecommunications system consisting of message-switched networks, accessed by remote concentrators. NADIN MSN provides flight plan, weather, and Notice to Airmen (NOTAM) information, and meets the International Civil Aviation Organization (ICAO) requirements for Aeronautical Fixed Telecommunications Network

(AFTN) support.

Oceanic Display and Planning System (key system)

The Oceanic Display and Planning System (ODAPS) consists of equipment that monitors and tracks aircraft over the ocean. It communicates and displays position data and flight plan information to the air traffic controllers responsible for monitoring and routing air traffic in the U.S. oceanic airspace. ODAPS has a situation display of aircraft position based on extrapolation of periodic voice position reports and filed flight plans. ODAPS includes a conflict probe (CP) functionality, which provides advance notification whenever stored flight plan information indicates that loss of separation minima may occur between aircraft, airspace reservations or warning areas.

Oceanic Flight Data Processing System

The Oceanic Flight Data Processing System (OFDPS) is Honolulu''s unique flight data processing system. It uses modified Oceanic Display and Planning System (ODAPS) software to provide limited flight data processing including providing paper flight strips for the Micro-EARTS system at the Honolulu Center Radar Approach Control (CERAP). Like ODAPS, OFDPS was rehosted on to new hardware using the existing OFDPS application software as part of the En Route Host/Oceanic Computer System Replacement (HOCSR) program. The OFDPS functionality will be replaced with STARS Preplanned Product Improvement (P3I) functionality.

Peripheral Adapter Module Replacement Item

The Peripheral Adapter Module Replacement Item (PAMRI) is an interface peripheral to the HOCSR. It provides a conduit through which the HOCSR receives and exchanges data, primarily radar data, flight data and interfacility data. The PAMRI converts communication protocols and translates data formats so the Host and EDARC can communicate with external devices.

Power Systems

The Power Systems (Pwr Sys) mechanism provides for the conditioning of commercial power, including uninterruptible power systems (UPS), to eliminate voltage dropouts, surges, and voltage sags caused by sources outside the facility. Power distribution, grounding, bonding and shielding of electrical system within the facility is also part of the Pwr Sys.

The Power Systems (Pwr Sys) mechanism provides the following: 1.) ACEPS Busway Replacements, 2.) ACEPS EG Maintenance, 3.) ACEPS Monitoring & Diagnostics, 4.) ACEPS Fuel System Upgrade, 5.) ACEPS Training, 6.) Battery Monitoring, 7.) Training Facility, 8.) CPDS, 9.) Battery Replacements, 10.) DC Systems, 11.) EG, 12.) LPGBS, 13.) Power Cable, 14.) UPS, 15.) Contract Support.

Radio Communication Link

Radio Communication Link (RCL) is an integrated voice and data microwave transmission system designed to provide the FAA with cost effective and reliable service for its high capacity NAS communications routes. RCL interconnects air route traffic control center (ARTCC) facilities with long range radar installations and other air traffic control (ATC) facilities.

Radio Control Equipment

Radio Control Equipment (RCE), located at both ATC facilities and remote communication sites, control the operation of remotely located ground to air Very High Frequency/Ultra High Frequency (VHF/UHF) radios used by air traffic controllers to communicate with pilots. RCE interfaces with the voice switch at the ATC facility, telephone landlines, and ground to air radios at the En Route Remote Communications Air/Ground (RCAG) sites, Terminal Remote Transmitter/Receiver (RTR) sites, and Flight Service Station Remote Communications Outlet (RCO) sites.

Satellite Telecommunications Data Link

Oceanic Centers use Satellite Telecommunications Data Link (SATCOM DL) mechanism transfer data between ground stations and aircraft. The FAA contracts for the satellite communications services and uses FANS-1A applications in the Oceanic automation system.

The FAA has no plans to develop its own SATCOM air to ground communications system.

Sustain Air Route Traffic Control Center Facilities

The Sustain Air Route Traffic Control Center Facilities (Sustain ARTCC Facilities) mechanism replaces obsolete equipment and rehabilitates space in Air Route Traffic Control Center (ARTCC) facilities.

Ultra High Frequency Airborne Radios (key system)

The Ultra High Frequency Avionics (UHF Avionics) are analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225-400 MHz frequency band, which are multi-channel transceivers, installed in an airborne military platform. These airborne devices support the tactical two-way voice communications/ coordination between the military pilot in the military aircraft and the controller on the ground.

Ultra High Frequency Ground Radios (key system)

Ultra High Frequency (UHF) Ground Radios are analog UHF amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 Mhz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and flight service station domains.

Ultra High Frequency Ground Radios - Replacement

The Ultra High Frequency Ground Radios - Replacement (UHF Ground Radios - Repl) mechanism represents analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 MHz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and Flight Service Station domains.

Very High Frequency Airborne Radios (key system)

Very High Frequency (VHF) Airborne Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 Mhz frequency band which are multi-channel transceivers installed in an airborne platform (e.g., commercial, cargo, and general aviation aircraft). These airborne devices support the tactical two-way voice communications/coordination between the pilot in the aircraft and the controller on the ground.

Very High Frequency Data Link - 2 Avionics

Very High Frequency Data Link - 2 Avionics (VDL-2 Avionics) consist of airborne radios operating in the very high frequency (VHF) range that receive and transmit data using a low-speed, bit-oriented protocol and Carrier Sense Multiple Access (CSMA).

Very High Frequency Ground Radios (key system)

Very High Frequency (VHF) Ground Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 MHz frequency band which are single-channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the pilot in commercial, cargo, or general aviation aircraft in the oceanic, en route (i.e., ARTCC), terminal (i.e., TRACON/tower), and flight service station domains. Additionally, there are analog VHF frequency modulation (VHF - FM) radio devices operating in the 161 - 174 MHz frequency band that are multi-channel transceivers. These transceivers are used by flight inspection, aviation security, and airway facility specialists supporting local airport operations and maintenance or to perform their operational maintenance mission in support of the NAS. However, these same VHF-FM transceivers are also used to support the resolution of emergency situations or establish a level of voice command and control communications/coordination during disaster recovery.

Very High Frequency Multi-Mode Airborne Radios

Very High Frequency Multi-Mode Airborne Radios (VHF MM Airborne Radios) refers to an airborne radio operating in the very high frequency (VHF) range capable of operating in the following modes: (1)) analog voice (i.e., 25 kHz spacing for use in the United States and other similarly equipped countries); (2) VHF Digital Link Mode 2 (VDL Mode-2) (two-way digital data transmission); (3) VHF Digital Link Mode 3 (VDL Mode-3), (integrated two-way digital voice/data transmission); and (4) analog voice (i.e., 8.33 kHz spacing for use in Europe and other similarly equipped countries).

Very High Frequency Omnidirectional Range Avionics

Very High Frequency Omnidirectional Range Avionics (VOR Avionics) receive, process, and display for the pilot the azimuth (bearing) to or from ground-based VOR transmitters.

Increasing numbers of aircraft are being equipped with GPS or WAAS avionics. However, since a reduced network of VOR stations is planned to continue in operation indefinitely as a backup to GPS, VOR avionics are expected to remain in service indefinitely in some aircraft.

Voice Switching and Control System

The Voice Switching and Control System (VSCS) is installed in the Air Route Traffic Control Center (ARTCC). The VSCS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The VSCS provides the Air Traffic Control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ARTCC (intercom), interconnectivity between controllers in separate ARTCCs (interphone), and interconnectivity between ARTCC controllers and Terminal Radar Approach Control (TRACON) controllers/Airport Traffic Control Tower (ATCT) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ARTCC controllers and pilots is also supported by the VSCS.

Voice Switching and Control System Modification (Control System Upgrade)

The VSCS control system upgrade (VCSU) is a replacement of the Tandem computers that perform the logical switching and control for the VSCS system. The replacement of Tandem computers is for all ARTCCs including three spares.

Voice Switching and Control System Modification (Technological Refresh)

The Tech Refresh for VSCS is a service life extension. The Tech Refresh encompasses workstation upgrade, video display monitor, control equipment power, VSCU supportability, control shelf power supply, and software development demonstration system expansion.

Voice Switching and Control System Training and Backup Switches

Voice Switching and Control System Training and Backup Switch (VTABS) was developed to meet AT requirements for a separate standalone VSCS Backup and Training System. VTABS can be configured as a 50-position switch with the capability to support air traffic operations in the event of VSCS failure, hardware and software maintenance or power loss.

People

Airline Operations Center Dispatcher

The Airline Operations Center Dispatcher (AOC Dispatcher) is a major airline employee that enters bulk flight plan requests and works with FAA by revising schedules and providing flight cancellations based on FAA provided data (aggregate demand lists, arrival rates, and parameters for anticipated ground delays.)

Non-Radar Controller

A Non-Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate transfer of control, communications, and flight data; Ensure computer entries are completed on instructions or clearances issued or received; Ensure strip marking is completed on instructions or clearances issued or received.

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Radar Associate Controller

A Radar Associate Controller performs the following activities: Ensure separation, initiate control instructions; operate interphones; Accept and initiate non-automated handoffs; and ensure radar controller is made aware of the actions; Assist the radar controller by accepting or initiating automated handoffs/pointouts which are necessary for the continued smooth operation of the sector, and ensure that the radar controller is made immediately aware of any action taken; Coordinate, including pointouts; Monitor radios when not performing higher priority duties; Scan flight progress strips; Correlate with radar data; Manage flight progress strips; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the radar controller when aware of those instructions.

Radar Controller

A Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate automated handoffs; Assist the radar associate controller with non-automated handoff actions when needed; Assist the radar associate controller in coordination when needed; Scan radar display; Correlate with flight progress strip information; Ensure computer entries are completed on instructions or clearances you issue or receive; Ensure strip marking is completed on instructions or clearances you issue or receive.

Interfaces

Dynamic Ocean Tracking System Plus — (Flight Data) → Dynamic Ocean Tracking System Plus

The DOTS + exchanges flight data.

Dynamic Ocean Tracking System Plus — (Target Data) → Dynamic Ocean Tracking System Plus

The DOTS + exchanges position reports.

Flight Data Input/Output ← (Flight Data) → Flight Data Input/Output

The FDIOs in ARTCCs, TRACONs, ATCTs, and two Oceanic centers (New York and Oakland) exchange flight data with FDIOs in other ARTCCs, FDIOs TRACONs, ATCTs, and two Oceanic Centers (New York and Oakland).

Ultra High Frequency Ground Radios ← (Voice Communication) → Ultra High Frequency Airborne Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Very High Frequency Ground Radios ← (Voice Communication) → Very High Frequency Airborne Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Issues

None

Service Group Air Traffic Services

Service TM-Synchronization

Capability Airborne

Operational Improvement

Current Tactical Management Of Flow in the En Route for Arrivals/Departures (104115)

Proper spacing and sequencing of air traffic maximizes NAS efficiency and capacity in the arrival and departure phases of flight. Controllers provide traffic synchronization to aircraft by monitoring the situation, making control decisions, and modifying flight trajectories to meet operational objectives and accommodate user preferences. They achieve this by applying manual controller optimization procedures. Traffic specialists and controllers use traffic displays (radar and enhanced traffic management system) and flight strips to establish flow initiatives, such as assignment to alternative arrival flows or miles-in-trial requirements.

01-Apr-2000 to 31-Jul-2008

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Departure: Tactical Terminal Operations. The Air Traffic Control Tower (ATCT) Local Controller instructs the pilot, after he/she takes off from a towered airport, to contact the Terminal Radar Approach Control (TRACON) Departure Controller for further departure information. The departure controller monitors the aircraft and provides air traffic control services using flight plan information, weather, and radar information from a ground-based network of radar, communications, and automation systems. Arrival: Before reaching the TRACON boundaries, Air Route Traffic Control Center (ARTCC) controllers establish inbound flows of aircraft over specified arrival fixes. During heavy volume, ARTCC controllers are responsible for sequencing aircraft to cross specific fixes at specific times. This process is called metering. The objective is to set up adequate spacing as the aircraft approach the En Route sector area or near the airport in order to maximize capacity. To achieve required miles-in-trail spacing, or to move each aircraft over the arrival fix to meet a required time of arrival, the estimated time of arrival, or a scheduled time of arrival, the controller may instruct an aircraft to reduce or increase speed; vector an aircraft through a series of turns; or have an aircraft enter a holding pattern. At selected ARTCCs, the Traffic Management Advisor (TMA) enhances traffic flow to airports by providing en route controllers and traffic manager□s arrival scheduling tools to synchronize traffic.

The ARTCC air traffic controllers control arriving aircraft that enter the ARTCC from an adjacent ARTCC or depart from feeder airports within the ARTCC. On the basis of the current and future traffic flow, the Traffic Management Coordinator (TMC) creates a plan to deliver the aircraft, safely separated, to the TRACON at a rate that fully subscribes, but does not exceed, the capacity of the TRACON and destination airport.

The TMC's plan consists of sequences and Scheduled Time of Arrival(STA) at the meter fix, which consists of published points that lie on the ARTCC/TRACON boundary. The ARTCC air traffic controller issues clearances to aircraft so that they cross the meter fixes at the STA specified in the TMC's plan.

Aircraft descend through the airspace and are transferred from high to low sectors in the ARTCC to arrival controllers in the TRACON and on to local controllers in the tower.

Pilots follow ATC instructions while stepping down through altitudes, being queued into landing order by a team of controllers who make decisions based on any number of local conditions and parameters. When reporting on the frequency of the arrival controller, the pilot calls out the aircraft identification, current altitude, and the altitude to which the aircraft is cleared. The controller verifies the altitude based on a comparison of the pilot□s reported altitude and the alphanumeric readout on the controller's display. The aircraft is then sequenced to join the arrival flow with other aircraft that entered the TRACON airspace.

Benefits

Current operations are provided in the NAS.

Systems

Air Route Surveillance Radar - Model 2 (key system)

The Air Route Surveillance Radar - Model 2 (ARSR-2) is a 1970s analog radar. It is a long-range radar system with a maximum detection range of 200 nm. The ARSR-2 is a surveillance system used to detect azimuth and slant range of en route aircraft operating between terminal areas. It also provides weather intensity data.

Air Route Surveillance Radar - Model 3 (key system)

The Air Route Surveillance Radar - Model 3 (ARSR-3) is a 1980s radar that provides primary long range surveillance data, including slant range and azimuth data. It processes the returns which includes demodulation, analog-to-digital conversion, moving target indicator function, sensitivity time control, range and azimuth gating, and digital target extraction - all of which are performed digitally (with the exception of the demodulation and analog-to-digital conversion). In addition, the

ARSR-3 has a weather channel with associated processing to provide weather contour information in digital format.

Air Route Surveillance Radar - Model 4 (key system)

The Air Route Surveillance Radar - Model 4 (ARSR-4) is a three-dimensional, long-range, rotating phased array, primary surveillance radar with integrated height finder capability. It is part of the joint surveillance system (JSS) used in conjunction with ARSR-3 coverage as part of the nationwide air defense command surveillance network. In addition to functions peculiar to the military, the ARSR-4 performs the same basic functions of the ARSR-3, by providing primary long-range surveillance data, including slant range and azimuth data.

Air Traffic Control Beacon Interrogator - Model 4 (key system)

The Air Traffic Control Beacon Interrogator - Model 4 (ATCBI-4) is an air traffic control (ATC) beacon system that interrogates transponder-equipped aircraft. It is a secondary radar system that interrogates transponders, receives aircraft identification, and determines position data.

Air Traffic Control Beacon Interrogator - Model 5 (key system)

The Air Traffic Control Beacon Interrogator - Model 5 (ATCBI-5) is an air traffic control (ATC) beacon system that interrogates transponder-equipped aircraft. It is a secondary radar system that interrogates transponders, receives aircraft identification, and determines position data.

Airport Surveillance Radar - Model 11

The Airport Surveillance Radar- Model 11 (ASR-11) is a digital, combined primary and secondary surveillance radar (SSR), short-range radar system with a 60 nautical mile (nmi) detection range for medium and small activity airports. The ASR-11 provides advanced digital primary radar including weather intensity surveillance with an integrated monopulse SSR system for use in the airport terminal area. The ASR-11 is used to detect and report the presence and location of an aircraft in a specific volume of airspace. The ASR-11 provides search radar surveillance coverage in controlled airspace primarily in terminal areas.

Airport Surveillance Radar - Model 7

The Airport Surveillance Radar - Model 7 (ASR-7) is a short-range (60 nm) analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the Air Traffic Control Beacon Interrogator - Model 4 or Model 5 (ATCBI-4 or ATCBI-5) or Mode S. This system will be replaced by the ASR-11.

Airport Surveillance Radar - Model 8

The Airport Surveillance Radar - Model 8 (ASR-8) is a short-range (60 nm), analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the Air Traffic Control Beacon Interrogator - Model 4 or Model 5 (ATCBI-4 or ATCBI-5) or Mode S.

Airport Surveillance Radar - Model 9

The Airport Surveillance Radar - Model 9 (ASR-9) is a short range (60 nm) radar system for the airport terminal area. The ASR-9 processes the returns from aircraft targets, which includes demodulation, analog-to-digital conversion, range and azimuth gating, sensitivity timing control, and a moving target detection function. The moving target detector includes two-level weather contour processing, digital signal processing, correlation and interpolation processing, and surveillance processing. The ASR-9 has a separate weather channel with associated processing capable of providing six-level weather contours. The two-level weather contour processing associated with the moving target detector is only be used for backup. The six-level weather channel is primarily used to supplement Next Generation Weather Radar (NEXRAD) coverage. It is normally used in conjunction with Mode Select (Mode S) but it can accommodate an Air Traffic Control Beacon Interrogator Model 4/5 (ATCBI-4/5).

The ASR-9 will be upgraded/replaced with the ASR-9/Mode S SLEP (see separate mechanism) in the 2007-12 time frame.

Automatic Direction Finder

Automatic Direction Finder (ADF) - An aircraft radio navigation system which senses and indicates the direction to a L/MF nondirectional radio beacon (NDB) ground transmitter. Direction is indicated to the pilot as a magnetic bearing or as a relative bearing to the longitudinal axis of the aircraft depending on the type of indicator installed in the aircraft. In certain applications, such as military, ADF operations may be based on airborne and ground transmitters in the VHF/UHF frequency spectrum.

Backup Emergency Communications

Back Up Emergency Communications (BUEC) provides a secondary A/G communications path for the en route environment, giving each controller access to another completely diverse radio channel. The original system, previously employed at all 20 CONUS ARTCCs, uses a limited number of tunable transceivers that are shared by a greater number of controllers through a priority system at the ARTCC.

The old BUEC is being replaced with dedicated BUEC channels on a one per sector basis to solve a serious supportability problem with the 30+-year-old system and to provide each controller with improved back up radio coverage. The new BUEC outlets have been sited for best coverage for the sectors"" service volumes that because of size require multiple RCAGs for coverage will have multiple BUEC sites. The program has no prime contractor. All activities including site selection, engineering, site preparation, transition, and testing are performed by the ANI and regional personnel. The Product Team provides equipment and funding for implementation. The new BUEC system employs the same equipment as the RCAGs.

Backup Emergency Communications Replacement

The Backup Emergency Communications (BUEC) Replacement (BUEC Repl) mechanism replaces existing analog BUEC system with an updated analoq BUEC system. Also provides backup for Remote Communications Air-Ground Facility (RCAG) very high frequency (VHF) and ultra high frequency (UHF) communications channels (radio equipment) that are available to an Air Route Traffic Control Center (ARTCC) for immediate use if one or more primary RCAG frequencies fail. The system consists of remotely controlled equipment, and several VHF and UHF transceivers. A typical BUEC system may provide as many as 60 VHF and UHF transceivers for an ARTCC.

Conference Control System

The Conference Control System (CCS) is a replacement system for the legacy Operational Telephone System (OTS). The CCS is a telecommunications conferencing system that provides voice connectivity, switching, and teleconferencing capabilities for the Traffic Management Specialists and the NAS Operations Manager, at the FAA Air Traffic Control System Command Center (ATCSCC) in Herndon, VA. CCS enables communication from ATCSCC to Traffic Management Units (TMUs) at ARTCC and TRACONS, the Severe Weather Group at ARTCCs, FAA Regional Offices, FAA

Headquarters, Airline Operations Centers (AOCs), and the general aviation community.

Digital Voice Recorder System

Provides modern digital voice recording devices used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

In Feburary 2004, the DVRS was upgraded with a 24-channel card, which replaced the 16-channel card. This minor upgrade, called DVR II, was not extended to the systems installed prior to February 2004.

Direct Access Radar Channel

The Direct Access Radar Channel (DARC) provides a back-up processing path to provide surveillance data to the displays in the event of a primary channel (Host Computer System (HCS) failure. The DARC path is a physically, logically and electrically separate processing path (with diverse hardware and software) from the primary Host Computer System (HCS) Radar Data Processing (RDP) paths. Thus DARC provides a tertiary path, to keep radar data on the controller''s displays, should both HCS RDP paths be disabled for any reason. The DARC provides radar data processing, very limited flight data processing, but with significantly less functionality than the HCS. Basically, DARC serves as a lifeboat should both HCS processing paths become disabled.

Display System Replacement (key system)

The Display System Replacement (DSR) provides continuous real-time, automated support to air traffic controllers for the display of surveillance, flight data and other critical control information. This information is processed by the Host and Oceanic Computer System Replacement (HOCSR) and the Enhanced Direct Access Radar Channel (EDARC) subsystems. The DSR provides controller workstations, displays, and input/output devices and a communications infrastructure to connect the DSR with external processing elements of the en route ATC automation system.

Distance Measuring Equipment

Distance Measuring Equipment (DME) is a UHF (Ultra High Frequency) ground-based radio navigation aid. DME avionics transmit interrogation pulses, and the ground-based responder sends a reply. The avionics process the reply and determine the slant range between the aircraft and the ground station. Separate funding segments and acquisition projects have been established for two generic classes of DME ground stations: High power (en route) DMEs, and low power (terminal) DMEs. This mechanism addresses the high power DMEs.

DMEs may be provided alone, but are more often collocated with a VOR to form a VOR/DME facility, allowing aircraft to determine both the bearing and slant range to the ground station - and hence a navigational position fix. DMEs are approved as a primary navigation system in the NAS. The DME function is frequently provided by the TACAN system that also provides azimuth guidance to military users. (DME and the distance-measuring portion of TACAN are functionally the same.) When combined with a VOR, these facilities are called VORTACs.

The DME network will be sustained to support en route navigation and to serve as an independent backup navigation source to GPS and GPS/WAAS. The DME network may also need to be expanded to provide a redundant area navigation (RNAV) capability for terminal area operations at major airports.

Distance Measuring Equipment Avionics

Distance Measuring Equipment Avionics (DME Avionics) receives, processes and displays for the pilot the distance data provided by ground-based DMEs.

Enhanced Traffic Management System (key system)

The Enhanced Traffic Management System (ETMS) application is at the heart of the Traffic Flow Management (TFM) system, and through it flows the network of all TFM interfaces. ETMS at the Command Center deals with the strategic flow of air traffic at the national level. ETMS at remote facilities is used for local airspace management within the local facility''s own area of responsibility. To facilitate coordination between the Traffic Management Coordinators (TMC) at remote Traffic Management Units (TMUs) and the Traffic Management Specialists (TMS) at the Air Traffic Control System Command Center (ARTSCC), each local ETMS may can also view the national composite picture of traffic for which the Command Center has responsibility. ETMS enables TMS and TMC personnel to track and predict traffic flows, analyze effects of ground delays or weather delays, evaluate alternative routing strategies, and plan traffic flow patterns.

The ETMS central hub is located at the Volpe National Transportation System Center. The hub collects flight schedules, and revisions, from NAS users, and collects actual traffic situation updates from local ETMS TMUs, and combines these with planned traffic initiatives (e.g., Ground Delay Programs) to generate an Aggregate Demand List (ADL) that is output to users every five (5) minutes. The ADL contains predicted arrival and departure traffic at individual airports. NAS users, e.g., air carriers, can access the ADL data to plan and revise their flight schedules to work more efficiently with planned traffic initiatives. This interactive process of flight planning gives users more input to TMCs on how traffic initiatives will affect them and is the heart of the Collaborative Decision Making (CDM) process.

Traffic Management Units (TMUs) are located throughout the NAS amd perform local flow control management functions. TMUs exist in all Air Route Traffic Control Centers (ARTCCs), 35 high activity Terminal Radar Approach Control (TRACONs), 8 Air Traffic Control Towers (ATCTs), 3 Center Radar Approach (CERAP) facilities, and the WJHTC. TMU hardware suites are automated workstations that include computer entry/readout devices, network communications, Flight Strip Printer (FSP), and a Traffic Situation Display (TSD).

NAS users are responsible for providing their own connectivity to the ETMS hub. The various connective user networks are collectively referred to as the CDM Network (CDMnet) which provides two-way connectivity to ETMS. Non-FAA users do not have access to all ETMS data and processing tools.

Federal Telecommunications System 2001

Federal Telecommunications System 2001 (FTS 2001) provides for a follow-on lease for Federal Telecommunications System 2000 functions. The telecommunications service contract that will provide administrative and National Airspace System (NAS) telecommunications support for the FAA. FTS 2001 will provide long distance voice, facsimile, video, and data services.

Flight Data Input/Output (key system)

The Flight Data Input/Output (FDIO) system provides flight progress information for use by the Tower, Terminal Radar Approach Control (TRACON) and Air Route Traffic Control Center (ARTCC) controllers. The FDIO system allows Air Traffic Control (ATC) Specialists to input automated flight data, perform data manipulation, and print flight strips.

Flight Data Input/Output Modification (Technical Refresh)

The Flight Data Input/Output Modification (Technical Refresh) (FDIO Mod (Tech Refresh)) mechanism replaces components that are uneconomical to maintain in the system providing an interface between the air traffic controller (terminal or en route) and the center computer. FDIO provides flight plan data in printed form for Airport Traffic Control Tower (ATCT) and Terminal Radar Approach Control (TRACON) controllers.

Flight Management System

Flight Management System (FMS) is a computer system that uses a large database to allow routes to be preprogrammed and stored. The system is constantly updated with respect to position accuracy by reference to one or more conventional radio navigation aids (i.e., multi-sensor systems). The system may also use information from an inertial reference unit (IRU) or from a stand-alone inertial navigation system (INS). A sophisticated program and its associated database ensure that the most appropriate navaids are automatically selected during the update cycle. FMSs combine the relative position information from two or more point-referenced navigation aids such as VOR or DME to determine the absolute position of the aircraft (latitude, longitude). The resulting Area Navigation (RNAV) capability permits operation on any desired course.

Global Positioning System

The Global Positioning System (GPS) is a worldwide, all-weather, satellite-based navigation system developed, maintained & operated by the U.S Department of Defense, and managed by an Interagency executive board. GPS is a (nominal) 24 satellite constellation orbiting at approximately 12,000 miles above the earth in six planes. Each satellite broadcasts a precisely timed L-band signal on the same frequency. User GPS receivers, oboard aircraft, in ground vehicles or hand-held, receive and process the signals from all satellites in view, with a minimum of four satellites necessary to determine the receiver''s three-dimensional position (i.e., latitude, longitude and altitude), velocity (if applicable) and the precise time of day. GPS equipped aircraft can navigate on published jetways or utilize Area Navigation (RNAV) to fly any desired course between two locations.

GPS avionics built to TSO C-129 support en route and terminal area navigation, as well as non-precision instrument approach operations. Approval has been granted for properly certified GPS avionics to be used as a primary means of navigation in oceanic airspace and in certain remote areas. In July 2003 the Wide Area Augmentation System (WAAS)was commissioned to augment the GPS signal to meet primary navigation service requirements for accuracy, coverage, availability, and integrity.

Global Positioning System Avionics

Global Positioning System (GPS) Avionics process the signals received from four or more GPS satellites and determine the three-dimensional position (i.e., latitude, longitude and altitude) and velocity of an aircraft, as well as the precise time of day. GPS avionics provide an Area Navigation (RNAV) capability that permits operation on any desired course.

GPS avionics built to TSO-C129 do not have augmentation (WAAS, LAAS) and are approved only as a supplemental navigation system in the NAS, meaning that they must be used in conjunction with a primary navigation system. TSO-C129 avionics support en route and terminal area navigation, as well as non-precision instrument approach operations. Approval has been granted for properly certified GPS avionics to be used as a primary means of navigation in oceanic airspace and in certain remote areas. In certain regions of the world (including the NAS), GPS will be augmented (Wide Area and Local Area systems) to satisfy additional requirements for accuracy, coverage, availability, and integrity. Augmented GPS avionics (WAAS, LAAS) are expected to support precision instrument approach operations, and to gain approval as a primary navigation system throughout the NAS. It is anticipated that users will migrate from TSO-C129 avionics to augmented GPS avionics (WAAS, LAAS).

High Frequency Airborne Radios

High Frequency (HF) Airborne Radios are analog (HF multi-channel radio transceivers operating in the 2 - 30 Mhz frequency band installed in airborne commercial, cargo, and military aircraft transiting the oceanic, en route, terminal, or flight service station airspace domains. These transceivers are typically used in transoceanic applications.

Host Computer System (key system)

The Host Computer System (HCS) receives and processes surveillance reports, and flight plan information. The HCS sends search/beacon target, track and flight data, surveillance and alphanumeric weather information, time data, traffic management advisories and lists to the (Display System Replacement) DSR. The HCS associates surveillance-derived tracking information with flight-planning information. The DSR sends requests for flight data, flight data updates, and track control messages to the HCS. HCS-generated display orders are translated for use within the DSR workstation. While radar data processing is distributed among the terminal and En Route computer resources, the HCS performs virtually all of the flight data processing for its entire geographical area of responsibility. Every tower (ATCT) and terminal radar approach control (TRACON) relies exclusively on its parent HCS for flight data.

The HCS also runs algorithms that perform aircraft to aircraft (conflict alert) and aircraft to terrain (Minimum Safe Altitude Warning) separation assurance. The HCS algorithms provide visual and audible alerting to the controller when conflicts are identified.

The HCS presently supplies real time surveillance, flight data and other information to several decision support tools housed in collocated outboard processors connected via two-way high bandwidth links to the HCS and DSR. These are the (User Request Evaluation Tool, (URET), and the Traffic Management Advisory (TMA. URET performs probing of tentative flight plan changes to determine their viability. TMA provides sequencing and spacing information to align the aircraft in En Route airspace for approach.

Interfacility Communications

The Interfacility Communications (Interfacility Comm) includes all ground-to-ground communications systems connecting FAA facilities.

Loran-C Avionics

Loran-C Avionics receive, process, and display to the pilot the latitude and longitude of the aircraft""s current position, based on data received from ground-based equipment.

Loran-C is currently approved as a supplemental system in the NAS, meaning that it must be used in conjunction with a primary system. Current Loran-C avionics support en route and terminal area navigation but do not support instrument approach operations. System operation beyond 2008 depends upon analysis by FAA and USCG to ascertain ability to support aviation nonprecision approach operations and maritime harbor entrance & approach operations.

Multi-Mode Digital Radios

Multi-Mode Digital Radios (MDRs) are ground-based Very High Frequency (VHF) air-traffic-control radios that can operate in several configurations: 1) analog voice with 25kHz channel spacing; 2) analog voice with 8.33 kHz channel spacing; and 3) VHF Data Link (VDL) Mode-3 which consists of two-way digital voice and data communication.

Operational Telephone System

The Operational Telephone System (OTS) is a telecommunications conferencing system that provides voice connectivity, switching, and teleconferencing capabilities for Traffic Management Specialist (TMS) and the NAS Operations Manager (NOM), at the FAA Air Traffic Control System Command Center (ATCSCC) in Herdon, VA. The OTS interfaces with field facilities traffic management units (TMUs), the Severe Weather Group at Air Route Traffic Control Centers (ARTCCs), key FAA Regional Offices, FAA Headquarters, and the general aviation community including Airline Operations Centers (AOCs).

Peripheral Adapter Module Replacement Item (key system)

The Peripheral Adapter Module Replacement Item (PAMRI) is an interface peripheral to the HOCSR. It provides a conduit through which the HOCSR receives and exchanges data, primarily radar data, flight data and interfacility data. The PAMRI converts communication protocols and translates data formats so the Host and EDARC can communicate with external devices.

Power Systems

The Power Systems (Pwr Sys) mechanism provides for the conditioning of commercial power, including uninterruptible power systems (UPS), to eliminate voltage dropouts, surges, and voltage sags caused by sources outside the facility. Power distribution, grounding, bonding and shielding of electrical system within the facility is also part of the Pwr Sys.

The Power Systems (Pwr Sys) mechanism provides the following: 1.) ACEPS Busway Replacements, 2.) ACEPS EG Maintenance, 3.) ACEPS Monitoring & Diagnostics, 4.) ACEPS Fuel System Upgrade, 5.) ACEPS Training, 6.) Battery Monitoring, 7.) Training Facility, 8.) CPDS, 9.) Battery Replacements, 10.) DC Systems, 11.) EG, 12.) LPGBS, 13.) Power Cable, 14.) UPS, 15.) Contract Support.

Radio Control Equipment

Radio Control Equipment (RCE), located at both ATC facilities and remote communication sites, control the operation of remotely located ground to air Very High Frequency/Ultra High Frequency (VHF/UHF) radios used by air traffic controllers to communicate with pilots. RCE interfaces with the voice switch at the ATC facility, telephone landlines, and ground to air radios at the En Route Remote Communications Air/Ground (RCAG) sites, Terminal Remote Transmitter/Receiver (RTR) sites, and Flight Service Station Remote Communications Outlet (RCO) sites.

Standard Terminal Automation Replacement System

The Standard Terminal Automation Replacement System (STARS) processes primary and secondary radar information to acquire and track data points to display aircraft position for controllers. STARS provides safety tools such as, conflict alert (CA), Mode C intruder (MCI), final monitoring aid (FMA), Minimum Safe Altitude Warning (MSAW), Converging Runway Display Aid (CARDA), and Controller Automated Spacing Aid (CASA). Also, STARS provides the capability to implement the following enhancements: improved radar processing, Global Positioning System (GPS) compatibility, adaptive routing, Center Terminal Radar Approach Control (TRACON) Automation System (CTAS), data link implementation, improved weather display, and better utilization of traffic management information.

Traffic Management Advisor Display (Free Flight Phase 1) (TMA Display (FFP1)) (key system)

The Traffic Management Advisor Display (Free Flight Phase 1) (TMA Display (FFP1)) is located at the Traffic Management Unit (TMU) and displays two views: The Timeline Graphical User Interface (TGUI) (TMA timeline data), and the Plan Graphical User Interface (PGUI) (Plan View Display).

Separate from the TMA Display in the TMU, TMA meter list data is passed from the TMA workstation to Host for display on the Display System Replacement (DSR) console.

Traffic Management Advisor Single Center (Free Flight Phase 1) (key system)

Traffic Management Advisor Single Center (Free Flight Phase 1) (TMA SC (FFP1)) computes flight arrival sequencing, scheduled time of arrival (STA), and estimated time of arrival (ETA) at various points along the aircraft flight path to an airport. These points include an outer meter arc, the meter fix, the final approach fix, and runway threshold. In response to changing events and controller inputs, TMA-SC provides results to the en route sector team to maintain optimum flow rates to runways. It does this by providing continual updates of meter fix STA and delay information at a speed comparable to the live radar update rates. The team defines maneuvers and issues clearances so aircraft cross the meter fixes at the STA. Since TMA-SC calculates a schedule for arriving aircraft to meet Terminal Radar Approach Control Facility (TRACON) acceptance rates set by Traffic Management Specialists (TMSs), selected airports must be the basis for a TMA-SC deployment plan. TMA also maintains statistics on the traffic flow and the efficiency of the airport and displays them to TMSs.

FFP1 deploys TMA SC to 7 sites and is followed by FFP2, which adds 4 more sites. Software at the FFP1 locations will be upgraded during FFP2 for consistentcy and commonality with the systems being deployed to the FFP2 locations.

Traffic Situation Display

The Traffic Situation Display (TSD) is a computer system that receives radar track data from Air Route Traffic Control Centers (ARTCCs), organizes this data into a mosaic display, and presents it on a computer screen to monitor any number of traffic situations or system-wide traffic flows. The display allows the traffic management coordinator multiple methods of selection and highlighting of individual aircraft or groups of aircraft. The user has the option of superimposing these aircraft positions over any number of background displays. These background options include ARTCC boundaries, any stratum of en route sector boundaries, fixes, airways, military and other special use airspace (SUA), airports, and geopolitical boundaries.

Ultra High Frequency Airborne Radios (key system)

The Ultra High Frequency Avionics (UHF Avionics) are analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225-400 MHz frequency band, which are multi-channel transceivers, installed in an airborne military platform. These airborne devices support the tactical two-way voice communications/ coordination between the military pilot in the military aircraft and the controller on the ground.

Ultra High Frequency Ground Radios (key system)

Ultra High Frequency (UHF) Ground Radios are analog UHF amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 Mhz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and flight service station domains.

Ultra High Frequency Ground Radios - Replacement

The Ultra High Frequency Ground Radios - Replacement (UHF Ground Radios - Repl) mechanism represents analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 MHz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and Flight Service Station domains.

Very High Frequency Airborne Radios (key system)

Very High Frequency (VHF) Airborne Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 Mhz frequency band which are multi-channel transceivers installed in an airborne platform (e.g., commercial, cargo, and general aviation aircraft). These airborne devices support the tactical two-way voice communications/coordination between the pilot in the aircraft and the controller on the ground.

Very High Frequency Data Link - 2 Avionics

Very High Frequency Data Link - 2 Avionics (VDL-2 Avionics) consist of airborne radios operating in the very high frequency (VHF) range that receive and transmit data using a low-speed, bit-oriented protocol and Carrier Sense Multiple Access (CSMA).

Very High Frequency Ground Radios (key system)

Very High Frequency (VHF) Ground Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 MHz frequency band which are single-channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the pilot in commercial, cargo, or general aviation aircraft in the oceanic, en route (i.e., ARTCC), terminal (i.e., TRACON/tower), and flight service station domains. Additionally, there are analog VHF frequency modulation (VHF - FM) radio devices operating in the 161 - 174 MHz frequency band that are multi-channel transceivers. These transceivers are used by flight inspection, aviation security, and airway facility specialists supporting local airport operations and maintenance or to perform their operational maintenance mission in support of the NAS. However, these same VHF-FM transceivers are also used to support the resolution of emergency situations or establish a level of voice command and control communications/coordination during disaster recovery.

Very High Frequency Multi-Mode Airborne Radios

Very High Frequency Multi-Mode Airborne Radios (VHF MM Airborne Radios) refers to an airborne radio operating in the very high frequency (VHF) range capable of operating in the following modes: (1)) analog voice (i.e., 25 kHz spacing for use in the United States and other similarly equipped countries); (2) VHF Digital Link Mode 2 (VDL Mode-2) (two-way digital data transmission); (3) VHF Digital Link Mode 3 (VDL Mode-3), (integrated two-way digital voice/data transmission); and (4) analog voice (i.e., 8.33 kHz spacing for use in Europe and other similarly equipped countries).

Very High Frequency Omnidirectional Range Avionics

Very High Frequency Omnidirectional Range Avionics (VOR Avionics) receive, process, and display for the pilot the azimuth (bearing) to or from ground-based VOR transmitters.

Increasing numbers of aircraft are being equipped with GPS or WAAS avionics. However, since a reduced network of VOR stations is planned to continue in operation indefinitely as a backup to GPS, VOR avionics are expected to remain in service indefinitely in some aircraft.

Voice Switching and Control System (key system)

The Voice Switching and Control System (VSCS) is installed in the Air Route Traffic Control Center (ARTCC). The VSCS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The VSCS provides the Air Traffic Control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ARTCC (intercom), interconnectivity between controllers in separate ARTCCs (interphone), and interconnectivity between ARTCC controllers and Terminal Radar Approach Control (TRACON) controllers/Airport Traffic Control Tower (ATCT) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ARTCC controllers and pilots is also supported by the VSCS.

Voice Switching and Control System Modification (Technological Refresh)

The Tech Refresh for VSCS is a service life extension. The Tech Refresh encompasses workstation upgrade, video display monitor, control equipment power, VSCU supportability, control shelf power supply, and software development demonstration system expansion.

People

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Planning Controller

A Planning Controller performs the following activities: Ensure separation; Initiate control instructions; Operate interphones; Conduct air/ground communications via data link; Coordinate tactical traffic flows; Scan flight data; Correlate with situation data; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the tactical controller when aware of those instructions.

Radar Associate Controller

A Radar Associate Controller performs the following activities: Ensure separation, initiate control instructions; operate interphones; Accept and initiate non-automated handoffs; and ensure radar controller is made aware of the actions; Assist the radar controller by accepting or initiating automated handoffs/pointouts which are necessary for the continued smooth operation of the sector, and ensure that the radar controller is made immediately aware of any action taken; Coordinate, including pointouts; Monitor radios when not performing higher priority duties; Scan flight progress strips; Correlate with radar data; Manage flight progress strips; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the radar controller when aware of those instructions.

Radar Controller

A Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate automated handoffs; Assist the radar associate controller with non-automated handoff actions when needed; Assist the radar associate controller in coordination when needed; Scan radar display; Correlate with flight progress strip information; Ensure computer entries are completed on instructions or clearances you issue or receive; Ensure strip marking is completed on instructions or clearances you issue or receive.

Tactical Controller

A Tactical Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios and data link; Oversee data link communications by the associate tactical controller; Accept and initiate automated handoffs; Assist the planning controller with non-automated handoff actions when needed; Assist the planning controller in coordination when needed; Scan the situation display; Correlate with flight data; Ensure computer entries are completed on instructions or clearances you issue or receive.

Traffic Management Specialist

Traffic Management Specialists perform the following activities: Balance air traffic demand with the airspace's capacity to maintain maximum and efficient utilization of the NAS; Coordinate and implement traffic management directives if needed for area of responsibility; Monitor and balance traffic flows within the area of responsibility in accordance with traffic management directives; Evaluate effectiveness of traffic management directives and make necessary adjustments; Document delay information.

Interfaces

Air Route Surveillance Radar - Model 2 — (Surveillance Data) → Peripheral Adapter Module Replacement Item

The ARSR-2 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the PAMRI interface, which then routes the data to the HCS and DARC for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 2 — (Weather Data) → Peripheral Adapter Module Replacement Item

The ARSR-2 long-range radar provides detected weather data to the PAMRI for processing at en route facilities.

Air Route Surveillance Radar - Model 3 — (Surveillance Data) → Peripheral Adapter Module Replacement Item

The ARSR-3 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the PAMRI interface, which then routes the data to the HCS and DARC for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 3 — (Weather Data) → Peripheral Adapter Module Replacement Item

The ARSR-3 long-range radar provides detected weather data to the PAMRI for processing at en route facilities.

Air Route Surveillance Radar - Model 4 — (Surveillance Data) → Peripheral Adapter Module Replacement Item

The ARSR-4 ground radar provides aircraft rho-theta positional data (azimuth and slant range) to the PAMRI interface, which then routes the data to the HCS and DARC for processing and use in controlling air traffic in the en route domain.

Air Route Surveillance Radar - Model 4 — (Weather Data) → Peripheral Adapter Module Replacement Item

The ARSR-4 ground radar provides Weather Precipitations rho-theta positional data (azimuth and slant range) to the PAMRI for processing and use in controlling air traffic in the en route domain.

Air Traffic Control Beacon Interrogator - Model 4 — (Surveillance Data) → Air Route Surveillance Radar - Model 2

The ARSR-2 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports via a CD-2, which sends the data to an automation system for tracking and display.

Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) → Air Route Surveillance Radar - Model 2

The ARSR-2 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports via a CD-2, which sends the data to an automation system for tracking and display.

Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) → Air Route Surveillance Radar - Model 3

The ARSR-3 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports and then sends the data to an automation system for tracking and display.

Air Traffic Control Beacon Interrogator - Model 5 — (Surveillance Data) → Air Route Surveillance Radar - Model 4

The ARSR-4 correlates beacon reports from the collocated secondary surveillance radar with its search radar reports and then sends the data to an automation system for tracking and display.

Enhanced Traffic Management System ← (Flight Data) → Enhanced Traffic Management System

Enhanced Traffic Management System ← (Track Data) → Enhanced Traffic Management System

Enhanced Traffic Management System ← (Weather Data) → Enhanced Traffic Management System

Flight Data Input/Output ← (Flight Data) → Flight Data Input/Output

The FDIOs in ARTCCs, TRACONs, ATCTs, and two Oceanic centers (New York and Oakland) exchange flight data with FDIOs in other ARTCCs, FDIOs TRACONs, ATCTs, and two Oceanic Centers (New York and Oakland).

Flight Data Input/Output ← (Flight Data) → Peripheral Adapter Module Replacement Item

The FDIO systems communicate flight data to PAMRI.

Host Computer System ← (Flight Data) → Display System Replacement

The HCS sends flight data, time data, traffic management advisories to the DSR display and sends flight plans to the Flight Strip Printer. HCS receives flight plan amendments from ATC via entries on the R-position DSR.

Host Computer System ← (Track Data) → Display System Replacement

The HCS sends target fixes and track data to DSR and receives re-assignment of surveillance to sectors from ATCs as needed. (Note: the type of data passed to DSR is not raw surveillance data but rather is Target (fixes) and track (series of fixes) data produced by the HCS RDP.

Host Computer System — (Weather Data) → Display System Replacement

The HCS sends alphanumeric weather data to the DSR. Note: This is different from weather graphics, which is displayed on the DSR D-position from WARP.

Host Computer System — (Flight Data) → Traffic Management Advisor Single Center (Free Flight Phase 1)

This interface provides flight sequencing, scheduled time of arrival (STA) and estimated time of arrival (ETA) at critical points along the projected paths of flights from en route to terminal airspace to an airport runway.

Host Computer System — (Track Data) → Traffic Management Advisor Single Center (Free Flight Phase 1)

This interface provides flight sequencing, scheduled time of arrival (STA) and estimated time of arrival (ETA) at critical points along the projected paths of flights from en route to terminal airspace to an airport runway.

Peripheral Adapter Module Replacement Item — (Track Data) → Enhanced Traffic Management System

Peripheral Adapter Module Replacement Item — (Flight Data) → Host Computer System

The PAMRI is a conduit through which the HCS receives and exchanges flight data with remote FDIO flight strip printer system (printer/display/keyboard) as well as with external automation systems such as ARTS/STARS (TRACON), ODAPS/FDP2000 (Ocean), and FSM (ATCSCC). FDIO uses the General Purpose Input/Output (GPI/O) parallel interfaces and automation systems use the Interfacility Communications Input/Output (INTI/O) serial interfaces.

Peripheral Adapter Module Replacement Item — (Surveillance Data) → Host Computer System

The PAMRI passes surveillance data from the primary/secondary radars to the HCS for processing and use in controlling aircraft.

Peripheral Adapter Module Replacement Item — (Flight Data) → Peripheral Adapter Module Replacement Item

The PAMRI passes flight data between ARTCCs.

Peripheral Adapter Module Replacement Item — (Track Data) → Peripheral Adapter Module Replacement Item

The PAMRI passes track data between ARTCCs.

Traffic Management Advisor Single Center (Free Flight Phase 1) — (Data Communication) → Host Computer System

Metering List

Traffic Management Advisor Single Center (Free Flight Phase 1) — (Target Data) → Traffic Management Advisor Display (Free Flight Phase 1) (TMA Display (FFP1))

Provides flight sequencing, scheduled time of arrival (STA) and estimated time of arrival (ETA) at critical points along the projected paths of flights from en route to terminal airspace to an airport runway. Displayed as timeline graphical user interface (TGUI) and plan graphical user interface (PGUI).

Ultra High Frequency Ground Radios ← (Voice Communication) → Ultra High Frequency Airborne Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Very High Frequency Ground Radios ← (Voice Communication) → Very High Frequency Airborne Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Voice Switching and Control System ← (Voice Communication) → Ultra High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Voice Switching and Control System ← (Voice Communication) → Very High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Voice Switching and Control System ← (Voice Communication) → Voice Switching and Control System

This interface enables ATC voice communication between controllers in same or different facilities.

Issues

none identified

Service Group Air Traffic Services

Service TM-Synchronization

Capability Airborne

Operational Improvement

Improve Wake Vortex Prediction (104113)

Controllers require a more accurate prediction of wake vortex conditions, caused by aircraft arriving or departing from airports.

01-Jan-2012 to 31-Dec-2029

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

The success of nowcast/forecast of wake vortex (WV) increases airport capacity by reducing the separation minima currently imposed by Air Traffic procedures, which were put in place to account for the WV hazard to an aircraft in trail of a larger aircraft during landing or takeoff. Improvements in the area of WV detection have affected the approach and departure phases of flight at the airport. Although there are procedural and technical approaches to resolve WV problems, technical solutions entail better knowledge of the atmosphere to model the character and location of wake vortices. Wake vortices affect NAS operations in two ways. First, they pose a potential safety hazard to in-trail aircraft due to the powerful vortices shedding off of the wings of large aircraft during landing and takeoff. The problem is most pronounced in light or calm wind conditions. The WV hazard is not limited to the same runway, as vortices may drift across the approach path of a smaller aircraft using a parallel or crossing runway. Second, wake vortices constrain airport capacity. Due to safety considerations, trailing aircraft are spaced farther behind large aircraft on approach and takeoff. This directly affects airport acceptance rates and capacity.

Ambient wind speed, turbulence, and atmospheric stability affect dissipation and movement of wake vortices. Actual detection of WV depends on analyzing data from various systems.The Wake Votex System (WVS)will include wind data from Automated Surface Observing System, Terminal Doppler Weather Radar, Low Level Wind shear Alert System, Meteorological Data Collection and Reporting System, Next Generation Weather Radar and other associated sensors. In addition, knowledge of atmospheric stability in the vicinity of the runways helps to provide forecasts of conditions favorable for WV. Improved atmospheric sensing systems also contribute to improved WV prediction.

Benefits

Runway operations will be sustained at a higher level, resulting in both time and fuel savings. Operations efficiency would be another benefit.

Systems

Airport Surveillance Radar - Model 11

The Airport Surveillance Radar- Model 11 (ASR-11) is a digital, combined primary and secondary surveillance radar (SSR), short-range radar system with a 60 nautical mile (nmi) detection range for medium and small activity airports. The ASR-11 provides advanced digital primary radar including weather intensity surveillance with an integrated monopulse SSR system for use in the airport terminal area. The ASR-11 is used to detect and report the presence and location of an aircraft in a specific volume of airspace. The ASR-11 provides search radar surveillance coverage in controlled airspace primarily in terminal areas.

Airport Surveillance Radar - Model 7

The Airport Surveillance Radar - Model 7 (ASR-7) is a short-range (60 nm) analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the Air Traffic Control Beacon Interrogator - Model 4 or Model 5 (ATCBI-4 or ATCBI-5) or Mode S. This system will be replaced by the ASR-11.

Airport Surveillance Radar - Model 8

The Airport Surveillance Radar - Model 8 (ASR-8) is a short-range (60 nm), analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the Air Traffic Control Beacon Interrogator - Model 4 or Model 5 (ATCBI-4 or ATCBI-5) or Mode S.

Airport Surveillance Radar - Model 9

The Airport Surveillance Radar - Model 9 (ASR-9) is a short range (60 nm) radar system for the airport terminal area. The ASR-9 processes the returns from aircraft targets, which includes demodulation, analog-to-digital conversion, range and azimuth gating, sensitivity timing control, and a moving target detection function. The moving target detector includes two-level weather contour processing, digital signal processing, correlation and interpolation processing, and surveillance processing. The ASR-9 has a separate weather channel with associated processing capable of providing six-level weather contours. The two-level weather contour processing associated with the moving target detector is only be used for backup. The six-level weather channel is primarily used to supplement Next Generation Weather Radar (NEXRAD) coverage. It is normally used in conjunction with Mode Select (Mode S) but it can accommodate an Air Traffic Control Beacon Interrogator Model 4/5 (ATCBI-4/5).

The ASR-9 will be upgraded/replaced with the ASR-9/Mode S SLEP (see separate mechanism) in the 2007-12 time frame.

Automated Radar Terminal System - Model IIE

The Automated Radar Terminal System - Model IIE (ARTS IIE) provides radar data processing (RDP) and decision support tools to the controller in the terminal environment. Utilized at low to medium-size Terminal Radar Control (TRACONs) Facilities the ARTS IIE is capable of receiving input from up to 2 sensors, can process up to 256 tracks simultaneously, and support up to 22 displays. The ARTS IIE implements the Common ARTS software for improved performance maintenance efficiency. The radar data processing (RDP) software provides automated surveillance tracking and display processing. Included in the ARTS IIE software are decision support tools such as Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Mode C intruder alert, Converging Runway Display Aid (CRDA), and Controller Automation Spacing Aid (CASA).

Automated Radar Terminal System - Model IIIA

The Automated Radar Terminal System - Model IIIA (ARTS IIIA) provides radar data processing (RDP) and decision support tools to the controller in the terminal environment. Utilized at larger airports, ARTS IIIA is capable of receiving input from up to three sensors, can process up to 900 tracks simultaneously and support up to 36 displays. The RDP software provides automated surveillance tracking and display processing. Included in the ARTS IIIA software are decision support tools such as Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Mode C intruder alert, Converging Runway Display Aid (CRDA), Final Monitor Aid (FMA), and controller automation spacing aid.

Automated Radar Terminal System - Model IIIE

The Automated Radar Terminal System - Model IIIE (ARTS IIIE) consists of the hardware platform and software required providing radar data processing (RDP) and decision support tools to the controller in the terminal environment. The ARTS IIIE is used at consolidated Terminal Radar Approach Control (TRACON) facilities. The Common ARTS program provided an ARTS IIIE capable of receiving input from up to 15 sensors, the ability to process up to 10,000 tracks simultaneously, and support up to 223 displays. The RDP software provides automated surveillance tracking and display processing including mosaic display of radar data. Included in the ARTS IIIE software are decision support tools such as Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Mode C intruder alert, Converging Runway Display Aid (CRDA), Final Monitor Aid (FMA), and controller automation spacing aid.

Backup Emergency Communications

Back Up Emergency Communications (BUEC) provides a secondary A/G communications path for the en route environment, giving each controller access to another completely diverse radio channel. The original system, previously employed at all 20 CONUS ARTCCs, uses a limited number of tunable transceivers that are shared by a greater number of controllers through a priority system at the ARTCC.

The old BUEC is being replaced with dedicated BUEC channels on a one per sector basis to solve a serious supportability problem with the 30+-year-old system and to provide each controller with improved back up radio coverage. The new BUEC outlets have been sited for best coverage for the sectors"" service volumes that because of size require multiple RCAGs for coverage will have multiple BUEC sites. The program has no prime contractor. All activities including site selection, engineering, site preparation, transition, and testing are performed by the ANI and regional personnel. The Product Team provides equipment and funding for implementation. The new BUEC system employs the same equipment as the RCAGs.

Distance Measuring Equipment

Distance Measuring Equipment (DME) is a UHF (Ultra High Frequency) ground-based radio navigation aid. DME avionics transmit interrogation pulses, and the ground-based responder sends a reply. The avionics process the reply and determine the slant range between the aircraft and the ground station. Separate funding segments and acquisition projects have been established for two generic classes of DME ground stations: High power (en route) DMEs, and low power (terminal) DMEs. This mechanism addresses the high power DMEs.

DMEs may be provided alone, but are more often collocated with a VOR to form a VOR/DME facility, allowing aircraft to determine both the bearing and slant range to the ground station - and hence a navigational position fix. DMEs are approved as a primary navigation system in the NAS. The DME function is frequently provided by the TACAN system that also provides azimuth guidance to military users. (DME and the distance-measuring portion of TACAN are functionally the same.) When combined with a VOR, these facilities are called VORTACs.

The DME network will be sustained to support en route navigation and to serve as an independent backup navigation source to GPS and GPS/WAAS. The DME network may also need to be expanded to provide a redundant area navigation (RNAV) capability for terminal area operations at major airports.

En Route Automation Modernization

The En Route Automation Modernization System (ERAM System) will replace the existing diverse but functionally unequal primary and backup channels (Host and DARC) with redundant, functionally equivalent primary and backup channels. The new primary and backup channels achieve identical full functionality by using highly reliable fault tolerant processing elements running identical software. A tertiary system with diverse software, and physical and electronic isolation from the ERAM primary and back-up systems, will be maintained as fall back until the functionality, reliability, and availability of ERAM is demonstrated in the field. A training subsystem with functionality identical to the operational system will permit training to be conducted in parallel with operations.

In the past decade, several functions (URET, CTAS, etc.) were implemented as outboard processors/processes to the Host. As ERAM evolves in successive builds, this functionality will be integrated into ERAM as described below.

ERAM''s enhanced FDP will accommodate flexible routing around congestion, weather, and restrictions and improve efficiency by providing improved traffic flows. The enhanced ERAM surveillance processing will accomodate a larger geographic coverage, increased quantity of radar inputs and, when available, integration of Automatic Dependent Surveillance Broadcast data. In addition ERAM will use the improved accuracy and information disseminated by the sensors using the All-purpose Structured EUROCONTROL Radar Information Exchange (ASTERIX) format.

ERAM will allow for improved performance of decision support tools such as the Enhanced Traffic Management System (ETMS). ERAM will also incorporate Center-terminal radar approach control automation system (CTAS) functions (descent advisor, timelines, load graphs, automated miles-in-trail, and the situation display) and multi-center metering using miles-in-trail or time-based scheduling and meter lists.

ERAM will employ an industry standard LAN-based system to improve the efficiency of integrating commercial-off-the-shelf solutions in the future. ERAM software will be developed using a common high-level language to increase the FAA''s access to market-based skills and lower the cost of development and lifecycle maintenance. ERAM''s design will enable future enhancements and maintenance of components without affecting operational availability and increased productivity from an integrated monitor and control capability.

En Route Communications Gateway

The En Route Communications Gateway (ECG) replaces PAMRI and provides a modernized LAN-based infrastructure capable of accommodating ERAM with minimal modifications. The PAMRI functions to be replaces include providing communications interfaces to external systems located in other ARTCCs, TRACONs, AFSSs, ATCSCC, NORAD, US Law Enforcement, US Customs, Military Base Operations, and international ACCs. Other interfaces include the FDIO Central Control Unit, which exchanges FDIO data with FAA and DOD facilities, and the NADIN Concentrator, which exchanges data through the NADIN PSN with the the M1FC via WMSCR. ECG increases the number of external interfaces to radars from 24 to 36. ECG provides internal interfaces between HCS and DARC (or EBUS) and between HCS and traffic flow processors such as ETMS and DSP. ECG includes a Monitor and Control subsystem and a display for monitoring up to two dozen radars--called the Random Access Plan Position Indicator (RAPPI).

The operational components of ECG consist of a front end processor (communications and surveillance interfaces), two gateway processors (internal connectivity to HCS and DARC/EBUS), and separate LANs that communicate between the front end and gateway processors on the primary channel and between the front end and gateway processors on the backup channel. The primary data path, consisting of the ECG primary gateway and the HCS, operate on separate hardware platforms. However, the backup data path, consisting of the ECG backup gateway and the EBUS, will operate on the same hardware platform--the ECG gateway platform. This processor, with both functions performed therein, is renamed to the Backup Interface Processor (BIP). In essence, a single processor operates on the backup channel, supporting both the ECG gateway function and the EBUS function. These two functions will remain, however, as two mechanisms in the NAS architecture.

Enhanced Terminal Voice Switch

The Enhanced Terminal Voice Switches (ETVS) are installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) facilities with more than four air traffic controller positions. The ETVS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The ETVS (installed in the ATCT) provides the ATC operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the ETVS.

The ETVS (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within a TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the ETVS.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate ETVS systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Flexible Voice Switch

Voice communications is the primary means of communications among ATC facilities and between an Air Traffic Control

Specialist (ATCS) and a pilot. Voice switching provides the ATCS both G/G Interfacility/Intrafacility and A/G voice communications connectivity. The NAS Voice Switch (NVS) program will replace aging voice switches and their analog interfaces with modern digital voice switches consisting of digital interfaces. The Flexible Voice Switch will be the common platform and baseline voice switch for all NAS domains with modularity and scalability to meet communications connectivity requirements. Additionally, this switch will be expandable to accommodate growth capacity requirements and able to support NAS Modernization needs as described in various Operational Improvements.

Flight Data Input/Output

The Flight Data Input/Output (FDIO) system provides flight progress information for use by the Tower, Terminal Radar Approach Control (TRACON) and Air Route Traffic Control Center (ARTCC) controllers. The FDIO system allows Air Traffic Control (ATC) Specialists to input automated flight data, perform data manipulation, and print flight strips.

General Weather Processor

The GWP collects, analyzes, tailors, displays, and distributes weather products. The GWP receives weather data from multiple sensors and distributes processed and tailored weather information via System Wide Information Management. The GWP provides a standard set of algorithms and access to data/products that convey current and future status of impacting weather to all National Airspace System services.

Host Computer System

The Host Computer System (HCS) receives and processes surveillance reports, and flight plan information. The HCS sends search/beacon target, track and flight data, surveillance and alphanumeric weather information, time data, traffic management advisories and lists to the (Display System Replacement) DSR. The HCS associates surveillance-derived tracking information with flight-planning information. The DSR sends requests for flight data, flight data updates, and track control messages to the HCS. HCS-generated display orders are translated for use within the DSR workstation. While radar data processing is distributed among the terminal and En Route computer resources, the HCS performs virtually all of the flight data processing for its entire geographical area of responsibility. Every tower (ATCT) and terminal radar approach control (TRACON) relies exclusively on its parent HCS for flight data.

The HCS also runs algorithms that perform aircraft to aircraft (conflict alert) and aircraft to terrain (Minimum Safe Altitude Warning) separation assurance. The HCS algorithms provide visual and audible alerting to the controller when conflicts are identified.

The HCS presently supplies real time surveillance, flight data and other information to several decision support tools housed in collocated outboard processors connected via two-way high bandwidth links to the HCS and DSR. These are the (User Request Evaluation Tool, (URET), and the Traffic Management Advisory (TMA. URET performs probing of tentative flight plan changes to determine their viability. TMA provides sequencing and spacing information to align the aircraft in En Route airspace for approach.

Integrated Communications Switching System Type I

The Integrated Communications Switching System Type I (ICSS I) are installed at Airport Traffic Control Towers (ATCT), Terminal Radar Approach Control (TRACON) facilities, and Automated Flight Service Stations (AFSS).

The ICSS I (installed in the ATCT) provides the air traffic control (ATC) operational ground-ground voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/air traffic control system command center (ATCSCC) specialists. Ground-air radio connectivity between ATCT controllers and pilots is also supported by the ICSS I.

The ICSS I (installed in the TRACON) provides the ATC operational ground-ground voice communications interconnectivity between controllers within TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Ground-air radio connectivity between TRACON controllers and pilots is also supported by the ICSS I.

The ICSS I (installed in the AFSS) provides the ATC operational ground-ground voice communications interconnectivity between specialists within an AFSS (intercom), interconnectivity between specialists in separate AFSSs (interphone), and interconnectivity between Flight Service Station (FSS) specialists and Air Route Traffic Control Center (ARTCC) controllers/TRACON controllers/ATCT controllers/Air Traffic Control System Command Center (ATCSCC) specialists. Ground-air radio connectivity between AFSS specialists and pilots is also supported by the ICSS I.

Integrated Terminal Weather System

The Integrated Terminal Weather System (ITWS) functions as a weather server in the terminal domain. It acquires data from FAA and National Weather Service (NWS) sensors as well as from aircraft in flight in the terminal area. The ITWS will provide aviation-oriented weather products to Air Traffic Control (ATC) personnel that are immediately usable without further meteorological interpretation.

Mode Select

The Mode Select (Mode S) mechanism is a ground-based system capable of selective interrogation of Mode S transponders and general interrogation of Air Traffic Control Radar Beacon System (ATCRBS) transponders within range. The system also receives, processes, and forwards the transponder replies to appropriate air traffic control (ATC) automation systems. Data formats for both interrogation and reply include data exchange capability.

The system also provides a Traffic Information Services (TIS) function that makes local traffic data available to the flight deck via the Mode S data link. TIS, a Mode S data link service, provides automatic traffic advisories to properly equipped aircraft. Pilots are able to request and receive a display of nearby traffic. The relative range, bearing, and altitude (if known) and a "proximate" or "threat" classification of nearby aircraft will be displayed in the cockpit.

Multi-Mode Digital Radios

Multi-Mode Digital Radios (MDRs) are ground-based Very High Frequency (VHF) air-traffic-control radios that can operate in several configurations: 1) analog voice with 25kHz channel spacing; 2) analog voice with 8.33 kHz channel spacing; and

3) VHF Data Link (VDL) Mode-3 which consists of two-way digital voice and data communication.

Power Systems

The Power Systems (Pwr Sys) mechanism provides for the conditioning of commercial power, including uninterruptible power systems (UPS), to eliminate voltage dropouts, surges, and voltage sags caused by sources outside the facility. Power distribution, grounding, bonding and shielding of electrical system within the facility is also part of the Pwr Sys.

The Power Systems (Pwr Sys) mechanism provides the following: 1.) ACEPS Busway Replacements, 2.) ACEPS EG Maintenance, 3.) ACEPS Monitoring & Diagnostics, 4.) ACEPS Fuel System Upgrade, 5.) ACEPS Training, 6.) Battery Monitoring, 7.) Training Facility, 8.) CPDS, 9.) Battery Replacements, 10.) DC Systems, 11.) EG, 12.) LPGBS, 13.) Power Cable, 14.) UPS, 15.) Contract Support.

Precision Runway Monitor

The Precision Runway Monitor (PRM) is a secondary radar system, similar to the Mode Select (Mode S), which operates and updates targets at a faster rate than that of the normal Air Traffic Control Radar Beacon System (ATCRBS) or Mode S system. This faster update rate provides improved precision in predicting target positions. The PRM system is utilized to increase efficiency of operations during instrument meteorological conditions (IMC) by allowing independent simultaneous approaches to parallel runways spaced less than 4,300-feet apart. A separate display is located in the TRACON to support these parallel runway operations.

The PRM sensor (secondary radar) will undergo a Service Life Extension at the end of its current service life. The display function will eventually be incorporated into STARS.

Radio Communication Link

Radio Communication Link (RCL) is an integrated voice and data microwave transmission system designed to provide the FAA with cost effective and reliable service for its high capacity NAS communications routes. RCL interconnects air route traffic control center (ARTCC) facilities with long range radar installations and other air traffic control (ATC) facilities.

Rapid Deployment Voice Switch Type I

The Rapid Deployment Voice Switch Type I (RDVS I) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS I (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the RDVS I. The RDVS I (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the RDVS I.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS I systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Rapid Deployment Voice Switch Type II

The Rapid Deployment Voice Switch Type II (RDVS II) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS II (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the RDVS II. The RDVS II (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the RDVS II.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS II systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Rapid Deployment Voice Switch Type IIA

The Rapid Deployment Voice Switch Type IIA (RDVS IIA) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS IIA (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. The RDVS IIA also supports air-to-ground (A/G) radio connectivity between ATCT controllers and pilots. The RDVS IIA (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between TRACON controllers and pilots is also supported by the RDVS IIA.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS IIA systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Small Tower Voice Switch

The Small Tower Voice Switch (STVS) is installed in small Airport Traffic Control Towers (ATCT) and in Flight Service Stations (FSS). The basic STVS has four operator positions. The STVS provides the Air Traffic Control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and Air Route Traffic Control Center (ARTCC) controllers/ Terminal Radar Approach Control (TRACON) controllers/FSS specialists/air traffic control system command center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the STVS. The STVS (installed in the FSS) provides the ATC operational G/G voice communications interconnectivity between specialists within an FSS (intercom), interconnectivity between specialists in separate FSSs (interphone), and interconnectivity between FSS specialists and Air Route Traffic Control Center (ARTCC) controllers/Terminal Radar Approach Control (TRACON) controllers/ATCT controllers/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground radio connectivity between FSS specialists and pilots is also supported by the STVS.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate STVS systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Standard Terminal Automation Replacement System

The Standard Terminal Automation Replacement System (STARS) processes primary and secondary radar information to acquire and track data points to display aircraft position for controllers. STARS provides safety tools such as, conflict alert (CA), Mode C intruder (MCI), final monitoring aid (FMA), Minimum Safe Altitude Warning (MSAW), Converging Runway Display Aid (CARDA), and Controller Automated Spacing Aid (CASA). Also, STARS provides the capability to implement the following enhancements: improved radar processing, Global Positioning System (GPS) compatibility, adaptive routing, Center Terminal Radar Approach Control (TRACON) Automation System (CTAS), data link implementation, improved weather display, and better utilization of traffic management information.

Traffic Flow Management System Applications Upgrade

Traffic Flow Management System Applications Upgrade (TFM Applications Upgrade) will be an integrated system used by traffic management specialists and coordinators to track and predict traffic flows; analyze effects of ground or weather delays; evaluate alternative routing strategies; improve collaborative decision making among users; plan traffic flow patterns; and assess daily and long term traffic flow performance in the National Airspace System (NAS) to better balance capacity and demand requirements for all users. Using the current Enhanced Traffic Flow Management System (ETMS) functionality as a baseline, this mechanism will evolve to a new open systems software architecture. This new architecture is expected to lower the life cycle cost of software maintenance, the development/integration of existing and future functionality and capabilities, and interface to other domain automation systems. This upgrade will facilitate new functionality and integrate existing TFM standalone subsystems and prototypes such as POET, TM Log, ESIS, DSP, etc. and improve the human computer interface (HCI).

Ultra High Frequency Airborne Radios

The Ultra High Frequency Avionics (UHF Avionics) are analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225-400 MHz frequency band, which are multi-channel transceivers, installed in an airborne military platform. These airborne devices support the tactical two-way voice communications/ coordination between the military pilot in the military aircraft and the controller on the ground.

Ultra High Frequency Ground Radios

Ultra High Frequency (UHF) Ground Radios are analog UHF amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 Mhz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and flight service station domains.

Ultra High Frequency Ground Radios - Replacement

The Ultra High Frequency Ground Radios - Replacement (UHF Ground Radios - Repl) mechanism represents analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 MHz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and Flight Service Station domains.

Very High Frequency Airborne Radios

Very High Frequency (VHF) Airborne Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 Mhz frequency band which are multi-channel transceivers installed in an airborne platform (e.g., commercial, cargo, and general aviation aircraft). These airborne devices support the tactical two-way voice communications/coordination between the pilot in the aircraft and the controller on the ground.

Very High Frequency Ground Radios

Very High Frequency (VHF) Ground Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 MHz frequency band which are single-channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the pilot in commercial, cargo, or general aviation aircraft in the oceanic, en route (i.e., ARTCC), terminal (i.e., TRACON/tower), and flight service station domains. Additionally, there are analog VHF frequency modulation (VHF - FM) radio devices operating in the 161 - 174 MHz frequency band that are multi-channel transceivers. These transceivers are used by flight inspection, aviation security, and airway facility specialists supporting local airport operations and maintenance or to perform their operational maintenance mission in support of the NAS. However, these same VHF-FM transceivers are also used to support the resolution of emergency situations or establish a level of voice command and control communications/coordination during disaster recovery.

Very High Frequency Multi-Mode Airborne Radios

Very High Frequency Multi-Mode Airborne Radios (VHF MM Airborne Radios) refers to an airborne radio operating in the very high frequency (VHF) range capable of operating in the following modes: (1)) analog voice (i.e., 25 kHz spacing for use in the United States and other similarly equipped countries); (2) VHF Digital Link Mode 2 (VDL Mode-2) (two-way digital data transmission); (3) VHF Digital Link Mode 3 (VDL Mode-3), (integrated two-way digital voice/data transmission); and (4) analog voice (i.e., 8.33 kHz spacing for use in Europe and other similarly equipped countries).

Wake Vortex System (key system)

The Wake Vortex System consists of a sensor suite that contains several sub-systems. It will constantly monitor wind, temperature, and turbulence along multiple approach/departure corridors as well as make short term (1 hour) predictions of changes for these parameters. Those expected changes in wind, temperature, and turbulence will be used to predict the time required for wake vortices (WV) to either move out of an approach corridor, onto a crossing or parallel runway, or to dissipate. These predictions will be fed into terminal automation systems (e.g., aFAST) to assist controllers in adjusting approach/departure spacing minima to mitigate the impact of WV on airport acceptance rates.

Support Activities

AT Procedure Development for Wake Vortex Forecast to ATC

Air Traffic Procedures document air traffic services and how they are implemented. The introduction of new systems, or changes to existing systems, may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

AT Training for Wake Vortex Forecast to ATC

Air Traffic (AT) training is provided to the AT workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AT Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

Non-FAA Pilot Training for Wake Vortex Forecast to ATC

Non-FAA Pilot Training is provided to educate pilots as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional pilot training. Training will generally begin 60 days prior to IOC and be complete within one year following Full Operating Capability.

People

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Planning Controller

A Planning Controller performs the following activities: Ensure separation; Initiate control instructions; Operate interphones; Conduct air/ground communications via data link; Coordinate tactical traffic flows; Scan flight data; Correlate with situation data; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the tactical controller when aware of those instructions.

Radar Associate Controller

A Radar Associate Controller performs the following activities: Ensure separation, initiate control instructions; operate interphones; Accept and initiate non-automated handoffs; and ensure radar controller is made aware of the actions; Assist the radar controller by accepting or initiating automated handoffs/pointouts which are necessary for the continued smooth operation of the sector, and ensure that the radar controller is made immediately aware of any action taken; Coordinate, including pointouts; Monitor radios when not performing higher priority duties; Scan flight progress strips; Correlate with radar data; Manage flight progress strips; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the radar controller when aware of those instructions.

Radar Controller

A Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate automated handoffs; Assist the radar associate controller with non-automated handoff actions when needed; Assist the radar associate controller in coordination when needed; Scan radar display; Correlate with flight progress strip information; Ensure computer entries are completed on instructions or clearances you issue or receive; Ensure strip marking is completed on instructions or clearances you issue or receive.

Tactical Controller

A Tactical Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios and data link; Oversee data link communications by the associate tactical controller; Accept and initiate automated handoffs; Assist the planning controller with non-automated handoff actions when needed; Assist the planning controller in coordination when needed; Scan the situation display; Correlate with flight data; Ensure computer entries are completed on instructions or clearances you issue or receive.

Traffic Management Specialist

Traffic Management Specialists perform the following activities: Balance air traffic demand with the airspace's capacity to maintain maximum and efficient utilization of the NAS; Coordinate and implement traffic management directives if needed for area of responsibility; Monitor and balance traffic flows within the area of responsibility in accordance with traffic management directives; Evaluate effectiveness of traffic management directives and make necessary adjustments; Document delay information.

Interfaces

no interfaces

Issues

none identified

Service Group Air Traffic Services
Service TM-Synchronization
Capability Airborne
Operational Improvement

Manage Arrival and Departure Flows by Crossing and Merging Virtual Streams (104120)

Placing aircraft into a virtual stream improves the flow of traffic in the en route envirnoment. In addition, controllers receiving descent profile information for planning an efficient flow enhance flight descent profiles for arriving aircraft.

30-Jun-2015 to 30-Jun-2024

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

The En Route Descent Advisor (EDA)and Expedite Departure Path (EDP) are support tools to assist controllers and improve efficiency within the NAS.

EDA enables user-preferred metering and separation in the departure, cruise, and arrival phases of flight. EDA provides fuel-efficient advisories for flow-rate conformance and integrates those advisories with conflict detection and resolution capabilities and minimal route structure. EDA lends itself well to such environments, in which it facilitates transition of "random" traffic into an efficient/organized flow at the destination. EDA capability facilitates the transition of en route procedures from today's sector orientation to a trajectory orientation. EDA provides the controller active advisories (i.e., suggested clearances such as speed, altitude, heading/routing); whereas, passive advisories suggest strategic actions such as sequence, delay to be absorbed, or runway assignment.

EDA is a set of automation tools, integrated into other automation systems, to assist the controller in delivering aircraft to the meter fix at a specified time and with specified crossing restrictions in a manner consistent with preferences of the aircraft operator. The advisories are computed to be consistent with the specific aircraft performance and onboard equipment (flight management system (FMS) or non-FMS) and computed to be conflict-free for the duration of the trajectory. The advisories are refreshed based on continuous analysis of new radar data and detection of nonconformance to clearances. EDA also contains spacing and conflict detection/resolution functions. The spacing function predicts the spacing between two or more aircraft when the first aircraft passes a beam of a selected reference fix. The predicted spacing is then reported to the controller in terms of either the relative separation or equivalent miles-in-trail distance, depending on controller preference. The conflict functions probe the predicted trajectories to determine if the relative separation between two aircraft will fall below a minimum (specified by the controller). This analysis is automatically updated to include the latest EDA trajectory predictions. Predicted conflicts are then displayed in terms of the aircraft involved, the time (minutes/seconds) until first loss of separation, and the predicted position of each aircraft at the first loss of separation. If a conflict is predicted, controllers may use EDA to evaluate their own resolution strategies via manual inputs. The EDA tool is available for display on both the Standard Automation Platform Workstation (SAP-WS) and on the Integrated Information Workstation (IIW). The Surveillance Data Processor (SDP) sends track data to the Flight Object Management System (FOMS) for association with the flight data.

EDP will provide controllers with timely climb, speed and heading advisories via the SAP-Workstation or IIW.Controllers will employ these advisories to efficiently merge aircraft into the enroute stream, and in some cases, allow expedited climb trajectories.

Benefits

EDA and EDP can lead to substantial benefits in capacity, fuel-efficiency, and controller productivity. Capacity benefits are achieved through accurate Terminal Radar Approach Control delivery under a Traffic Management Advisor plan that is optimized for maximum throughput to the runway. Expedited departures and unrestricted climbs will save both time and fuel for users.

Systems

Automatic Direction Finder

Automatic Direction Finder (ADF) - An aircraft radio navigation system which senses and indicates the direction to a L/MF nondirectional radio beacon (NDB) ground transmitter. Direction is indicated to the pilot as a magnetic bearing or as a relative bearing to the longitudinal axis of the aircraft depending on the type of indicator installed in the aircraft. In certain applications, such as military, ADF operations may be based on airborne and ground transmitters in the VHF/UHF frequency spectrum.

Backup Emergency Communications

Back Up Emergency Communications (BUEC) provides a secondary A/G communications path for the en route environment, giving each controller access to another completely diverse radio channel. The original system, previously employed at all 20 CONUS ARTCCs, uses a limited number of tunable transceivers that are shared by a greater number of controllers through a priority system at the ARTCC.

The old BUEC is being replaced with dedicated BUEC channels on a one per sector basis to solve a serious supportability problem with the 30+-year-old system and to provide each controller with improved back up radio coverage. The new BUEC outlets have been sited for best coverage for the sectors"" service volumes that because of size require multiple RCAGs for coverage will have multiple BUEC sites. The program has no prime contractor. All activities including site selection, engineering, site preparation, transition, and testing are performed by the ANI and regional personnel. The Product Team provides equipment and funding for implementation. The new BUEC system employs the same equipment as the RCAGs.

Communications Management System

The CMS Management and Control function performs tasks for overall management and control of all air/ground and ground/ground voice and data communications to support System Wide Information Management (SWIM). CMS will also incorporate a reconfiguration control function to support reconfigurable airspace assignments, data routing, and a digital recording for both voice and data.

The En Route Automation Modernization program has assumed the data recording function via the Standard Automation Platform, and the Digital Voice Recorder System performs the voice recording function. The CMS routing function is a data router that ensures transport of data communications among Air Traffic Control facilities and users of SWIM. Additionally, CMS integrates functionalities inherently provided by the voice switches, the voice recorders, and the ATN Router.

Conference Control System

The Conference Control System (CCS) is a replacement system for the legacy Operational Telephone System (OTS). The CCS is a telecommunications conferencing system that provides voice connectivity, switching, and teleconferencing capabilities for the Traffic Management Specialists and the NAS Operations Manager, at the FAA Air Traffic Control System Command Center (ATCSCC) in Herndon, VA. CCS enables communication from ATCSCC to Traffic Management Units (TMUs) at ARTCC and TRACONS, the Severe Weather Group at ARTCCs, FAA Regional Offices, FAA Headquarters, Airline Operations Centers (AOCs), and the general aviation community.

Digital Voice Recorder System Replacement

The Digital Voice Recorder System Replacement (DVRS Replacement) is a modern digital system used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

Distance Measuring Equipment

Distance Measuring Equipment (DME) is a UHF (Ultra High Frequency) ground-based radio navigation aid. DME avionics transmit interrogation pulses, and the ground-based responder sends a reply. The avionics process the reply and determine the slant range between the aircraft and the ground station. Separate funding segments and acquisition projects have been established for two generic classes of DME ground stations: High power (en route) DMEs, and low power (terminal) DMEs. This mechanism addresses the high power DMEs.

DMEs may be provided alone, but are more often collocated with a VOR to form a VOR/DME facility, allowing aircraft to determine both the bearing and slant range to the ground station - and hence a navigational position fix. DMEs are approved as a primary navigation system in the NAS. The DME function is frequently provided by the TACAN system that also provides azimuth guidance to military users. (DME and the distance-measuring portion of TACAN are functionally the same.) When combined with a VOR, these facilities are called VORTACs.

The DME network will be sustained to support en route navigation and to serve as an independent backup navigation source to GPS and GPS/WAAS. The DME network may also need to be expanded to provide a redundant area navigation (RNAV) capability for terminal area operations at major airports.

Distance Measuring Equipment Avionics

Distance Measuring Equipment Avionics (DME Avionics) receives, processes and displays for the pilot the distance data provided by ground-based DMEs.

Flexible Voice Switch

Voice communications is the primary means of communications among ATC facilities and between an Air Traffic Control Specialist (ATCS) and a pilot. Voice switching provides the ATCS both G/G Interfacility/Intrafacility and A/G voice communications connectivity. The NAS Voice Switch (NVS) program will replace aging voice switches and their analog interfaces with modern digital voice switches consisting of digital interfaces. The Flexible Voice Switch will be the common platform and baseline voice switch for all NAS domains with modularity and scalability to meet communications connectivity requirements. Additionally, this switch will be expandable to accommodate growth capacity requirements and able to support NAS Modernization needs as described in various Operational Improvements.

Flight Object Management System - En Route (key system)

The FOMS is a component of the Standard Automation Platform (SAP). The FOMS processes flight data received from multiple sources via the System Wide Information Management (SWIM) Management Unit. The FOMS also receives track data from the Surveillance Data Processor and associates tracks with flight data, producing the flight object, which is published to SWIM for subscriber use. Flight plan support functionality includes end-to-end profile evaluation in all phases of flight and evaluation against static and dynamic constraints (terrain, obstacles, airspace restrictions, etc.). The FOMS supports flight planning up to 180 days prior to day of flight. A user can access the flight object from initial to closeout in the same manner. The FOMS provides end-to-end flight data management from preflight to post analysis. Ownership of the flight object begins and ends with Traffic Flow Management and transitions during the flight to clearance delivery, ramp, surface, departure, transition to cruise, cruise, transition to arrival, and ramp. Flight data management is based on trajectory, assigned volumes, and "necessary" route structure.

General Weather Processor

The GWP collects, analyzes, tailors, displays, and distributes weather products. The GWP receives weather data from multiple sensors and distributes processed and tailored weather information via System Wide Information Management. The GWP provides a standard set of algorithms and access to data/products that convey current and future status of impacting weather to all National Airspace System services.

High Frequency Airborne Radios

High Frequency (HF) Airborne Radios are analog (HF multi-channel radio transceivers operating in the 2 - 30 Mhz frequency band installed in airborne commercial, cargo, and military aircraft transiting the oceanic, en route, terminal, or flight service station airspace domains. These transceivers are typically used in transoceanic applications.

Integrated Information Workstation - Build 1

IIW Build 1 will include the infrastructure and system interfaces to acquire, analyze, store, update, display, and manage the following information in an integrated manner: (1) National Airspace System (NAS) aeronautical, (2) airport environmental, (3) airborne and surface surveillance, (4) flight information, (5) weather information, and (6) NAS status. Build 1 will also replace its predecessor system, FAA Data Display System, as well as interface with the following systems in support of its mission: Flight Object Management, System Wide Information Management, Next Generation- Traffic Flow Management, Maintenance Management System, Unified Decision Management System, and Aeronautical Information Management.

Multi-Mode Digital Radios

Multi-Mode Digital Radios (MDRs) are ground-based Very High Frequency (VHF) air-traffic-control radios that can operate in several configurations: 1) analog voice with 25kHz channel spacing; 2) analog voice with 8.33 kHz channel spacing; and 3) VHF Data Link (VDL) Mode-3 which consists of two-way digital voice and data communication.

Power Systems

The Power Systems (Pwr Sys) mechanism provides for the conditioning of commercial power, including uninterruptible power systems (UPS), to eliminate voltage dropouts, surges, and voltage sags caused by sources outside the facility. Power distribution, grounding, bonding and shielding of electrical system within the facility is also part of the Pwr Sys.

The Power Systems (Pwr Sys) mechanism provides the following: 1.) ACEPS Busway Replacements, 2.) ACEPS EG

Maintenance, 3.) ACEPS Monitoring & Diagnostics, 4.) ACEPS Fuel System Upgrade, 5.) ACEPS Training, 6.) Battery Monitoring, 7.) Training Facility, 8.) CPDS, 9.) Battery Replacements, 10.) DC Systems, 11.) EG, 12.) LPGBS, 13.) Power Cable, 14.) UPS, 15.) Contract Support.

Radio Control Equipment

Radio Control Equipment (RCE), located at both ATC facilities and remote communication sites, control the operation of remotely located ground to air Very High Frequency/Ultra High Frequency (VHF/UHF) radios used by air traffic controllers to communicate with pilots. RCE interfaces with the voice switch at the ATC facility, telephone landlines, and ground to air radios at the En Route Remote Communications Air/Ground (RCAG) sites, Terminal Remote Transmitter/Receiver (RTR) sites, and Flight Service Station Remote Communications Outlet (RCO) sites.

Standard Automation Platform Workstation Phase 1

The SAP consists of the Flight Object Management System (FOMS), the Surveillance Data Processor (SDP), and the SAP Workstation. The SAP will be installed in En Route and Arrival/Departure facilities. The SDP performs surveillance data processing and tracking on Surveillance Data Objects received from the Surveillance Data Network. The FOMS performs flight plan processing, associates flight and track data, and publishes the Flight Object on the System Wide Information Management network. The SAP workstation provides the controller interface for the FOMS and SDP.

Surveillance Data Network

National Airspace System (NAS) surveillance systems, including radar and automatic dependent surveillance systems will provide surveillance data objects via the Surveillance Data Network (SDN), which is a sub-network of the System Wide Information Management (SWIM) and the FAA Telecommunication Infrastructure (FTI). The published Surveillance Data Objects (SDO) will be made available to NAS and other users, including the Transportation Security Administration, Department of Defense, and others. Surveillance data availability supports 3-mile separation standards, gate-to-gate traffic management, seamless airspace, and dynamic resectorization. Improved surveillance information is provided in a timely and consistent manner seamlessly across the NAS for operations, planning, and decision making. The information will be available to all users and service providers via SDO in near real time. This information enables decisions to be based on a shared common view of situations, even as conditions are changing. Improved surveillance with SDOs will provide the automation higher quality of data for seamless surveillance and, in combination with other capabilities and new procedures, enable capacity and safety improvements. These benefits accrue from increased situation awareness by decision makers and improved operation of decision support and analysis tools that use surveillance information.

Surveillance Data Processor (key system)

SDP is a component of SAP and operates in En Route and Terminal. The SDP will make improvements to sensors and automation systems that will allow for expanded use of 3-mile separation and terminal procedures. The operational improvements enable more efficient control of aircraft and use of airspace. To accomplish this, all 1030/1090 Beacon interrogators will be upgraded to disseminate their existing 1.2 milli-radian azimuth accuracy and other information, such as time of measurement, confidence, quality, and so on. The automation system algorithms will be improved or new algorithms will be developed to exploit the additional information content of the improved surveillance reports. The method of presentation (display) to support 3-mile separation will be developed and tested to ensure safety. The existing long-range sensor surveillance update period is (12 seconds) and is insufficient to support 3-mile separation. In areas where only long-range sensors exist and where the Air Traffic Service requires 3-mile separation, these sensors may be modified to double the update rate to achieve 3-mile separation.

Sustain Air Route Traffic Control Center Facilities

The Sustain Air Route Traffic Control Center Facilities (Sustain ARTCC Facilities) mechanism replaces obsolete equipment and rehabilitates space in Air Route Traffic Control Center (ARTCC) facilities.

System Wide Information Management Build 1B (key system)

Build 1B provides all items in 1A, including more NAS information. This build integrates Flight and Surveillance Information systems into the SWIM architecture.

Ultra High Frequency Airborne Radios

The Ultra High Frequency Avionics (UHF Avionics) are analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225-400 MHz frequency band, which are multi-channel transceivers, installed in an airborne military platform. These airborne devices support the tactical two-way voice communications/ coordination between the military pilot in the military aircraft and the controller on the ground.

Ultra High Frequency Ground Radios

Ultra High Frequency (UHF) Ground Radios are analog UHF amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 Mhz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and flight service station domains.

Very High Frequency Airborne Radios

Very High Frequency (VHF) Airborne Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 Mhz frequency band which are multi-channel transceivers installed in an airborne platform (e.g., commercial, cargo, and general aviation aircraft). These airborne devices support the tactical two-way voice communications/coordination between the pilot in the aircraft and the controller on the ground.

Very High Frequency Ground Radios

Very High Frequency (VHF) Ground Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 MHz frequency band which are single-channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the pilot in commercial, cargo, or general aviation aircraft in the oceanic, en route (i.e., ARTCC), terminal (i.e., TRACON/tower), and flight service station domains. Additionally, there are analog VHF frequency modulation (VHF - FM) radio devices operating in the 161 - 174 MHz frequency band that are multi-channel transceivers. These transceivers are used by flight inspection, aviation security, and airway facility specialists supporting local airport operations and maintenance or to perform their operational maintenance mission in support of the NAS. However, these same VHF-FM transceivers are also used to support the resolution of emergency situations or establish a level of voice command and control communications/coordination during disaster recovery.

Very High Frequency Multi-Mode Airborne Radios

Very High Frequency Multi-Mode Airborne Radios (VHF MM Airborne Radios) refers to an airborne radio operating in the very high frequency (VHF) range capable of operating in the following modes: (1)) analog voice (i.e., 25 kHz spacing for use in the United States and other similarly equipped countries); (2) VHF Digital Link Mode 2 (VDL Mode-2) (two-way digital data transmission); (3) VHF Digital Link Mode 3 (VDL Mode-3), (integrated two-way digital voice/data transmission); and (4) analog voice (i.e., 8.33 kHz spacing for use in Europe and other similarly equipped countries).

Very High Frequency Omnidirectional Range Avionics

Very High Frequency Omnidirectional Range Avionics (VOR Avionics) receive, process, and display for the pilot the azimuth (bearing) to or from ground-based VOR transmitters.

Increasing numbers of aircraft are being equipped with GPS or WAAS avionics. However, since a reduced network of VOR stations is planned to continue in operation indefinitely as a backup to GPS, VOR avionics are expected to remain in service indefinitely in some aircraft.

Support Activities

AT Procedure Development for Metering Virtual Streams for Crossing/Merging and Managing Flow for Arrivals and Departures

Air Traffic Procedures document air traffic services and how they are implemented. The introduction of new systems, or changes to existing systems, may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

AT Training for Metering Virtual Streams for Crossing/Merging and Managing Flow for Arrivals and Departures

Air Traffic (AT) training is provided to the AT workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AT Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

People

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Planning Controller

A Planning Controller performs the following activities: Ensure separation; Initiate control instructions; Operate interphones; Conduct air/ground communications via data link; Coordinate tactical traffic flows; Scan flight data; Correlate with situation data; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the tactical controller when aware of those instructions.

Radar Associate Controller

A Radar Associate Controller performs the following activities: Ensure separation, initiate control instructions; operate interphones; Accept and initiate non-automated handoffs; and ensure radar controller is made aware of the actions; Assist the radar controller by accepting or initiating automated handoffs/pointouts which are necessary for the continued smooth operation of the sector, and ensure that the radar controller is made immediately aware of any action taken; Coordinate, including pointouts; Monitor radios when not performing higher priority duties; Scan flight progress strips; Correlate with radar data; Manage flight progress strips; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the radar controller when aware of those instructions.

Radar Controller

A Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate automated handoffs; Assist the radar associate controller with non-automated handoff actions when needed; Assist the radar associate controller in coordination when needed; Scan radar display; Correlate with flight progress strip information; Ensure computer entries are completed on instructions or clearances you issue or receive; Ensure strip marking is completed on instructions or clearances you issue or receive.

Tactical Controller

A Tactical Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios and data link; Oversee data link communications by the associate tactical controller; Accept and initiate automated handoffs; Assist the planning controller with non-automated handoff actions when needed; Assist the planning controller in coordination when needed; Scan the situation display; Correlate with flight data; Ensure computer entries are completed on instructions or clearances you issue or receive.

Traffic Management Specialist

Traffic Management Specialists perform the following activities: Balance air traffic demand with the airspace's capacity to maintain maximum and efficient utilization of the NAS; Coordinate and implement traffic management directives if needed for area of responsibility; Monitor and balance traffic flows within the area of responsibility in accordance with traffic management directives; Evaluate effectiveness of traffic management directives and make necessary adjustments; Document delay information.

Interfaces

Surveillance Data Processor — (Track Data) → Flight Object Management System - En Route

"SDP sends correlated surveillance data to FOMS for further processing, including association with flight data.

System Wide Information Management Build 1B — (NAS Status Data) → Flight Object Management System - En Route

FOMS receives NAS status data via SWIM.

System Wide Information Management Build 1B — (Weather Data) → Flight Object Management System - En Route

FOMS receives weather products from GWP and other sources via SWIM.

System Wide Information Management Build 1B — (Surveillance Data) → Surveillance Data Processor

The SDN distributes surveillance data received from various sensors to NAS automation systems.

Issues

none identified

Optimize Runway Assignments - Terminal (104114)

Controllers improve sequencing and spacing of arriving aircraft with tools for better managing the runway assignment for aircraft in the terminal. This includes automation to generate instructions for aircraft heading and speed based on the addition of aircraft performance parameters to the algorithms and the addition of wake vortex information. This improves the terminal controller's ability to accommodate user requests for flight profiles and runway assignments while still optimizing flow. Pilots improve capabilities to follow other aircraft, fly approaches, and land on closely spaced parallel approaches in poor weather conditions. Additionally, a path from runway to en route stream is established to improve the flow of departure aircraft which includes using speed and heading advisories.

31-Jan-2016 to 30-Jun-2024

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Optimal Runway Planner operational improvements consist of three areas: Expedite Departure Path (EDP), Approach Spacing (previously active Final Approach Spacing Tool) and Closely Spaced Parallel Approaches. Expedite Departure Path.

These tools are integrated into automation systems. EDP provides an advisory decision support capability to assist controllers in: Load management for departing traffic, sequencing, spacing, and merging departing aircraft into the En Route stream. EDP aids traffic management specialists in the Traffic Management Unit as well as sector controllers in Terminal, En Route, Tower, and/or airline operational control facilities. Local facility procedures are incorporated into EDP. Initial functionality provides departure management assistance to Terminal Radar Approach Control (TRACON) controllers with En Route functionality to be provided in the future.

Approach Spacing

There is a need to improve use of available runways, optimize terminal area procedures/separation requirements, and reduce the large cognitive burden and workload for TRACON controllers and Traffic Management Coordinators (TMC) during periods of intense traffic. Improved approach spacing involves a component of the Center TRACON Automation System and a set of procedures for TRACON controllers and TMCs responsible for arrival/departure traffic. It will enable controllers and TMCs to manage more effectively the mixed aircraft environment by providing aircraft with dependable advisories for runway assignments and aircraft sequences. This will, in turn, reduce flight delays caused by traffic congestion.

The spacing component calculates and displays runway assignment and aircraft sequence advisories based on available position and other data on the Integrated Information Workstation controller display system. It also provides timelines and load graphs composed from the advisories to give controllers and TMCs both textual and graphical views of the advisories. The timeline or situation display can also be passed to the Air Traffic Control Tower controller if desired.

Parallel Approaches

Of the top 35 delayed airports in the National Airspace System, 16 have closely spaced parallel runways (parallel runways with centerlines separated by less than 4,300 feet), and 5 of the 8 pacer airports have closely spaced parallel runways. During visual meteorological conditions, simultaneous departures and arrivals may be conducted at those airports based on the use of visual procedures. Airport operations are relatively efficient, and delays can be minimized. As weather conditions deteriorate, simultaneous departures and arrivals based on visual procedures must be discontinued and standard instrument flight rules (IFR) aircraft separation must be provided.

Current Federal Aviation Administration IFR separation standards and procedures stipulate that with conventional terminal radars with an update rate of approximately 4.8 seconds, simultaneous independent approaches can be conducted to parallel runways with centerlines separated by at least 4,300 feet. Standard in-trail separation is provided between aircraft on the same approach course.

Operational improvements for closely spaced parallels use Automated Dependent Surveillance - Broadcast(ADS-B) technology. Using such airborne avionics as Cockpit Display of Traffic Information (CDTI), Flight Management System (FMS), and Required Navigation Performance (RNP), pilots are able to see and avoid other traffic and navigate with precision. Air traffic control personnel will be able to monitor and assist pilots if they a miss an approach.

NAS tools will include Broadcast Services Ground Station(BSGS),Flight Object Management System (FOMS)Intergated Information Workstation, Surveillance Data Processor (SDP) and System Wide Information Management (SWIM).

Benefits

Increased throughput and saving of time and fuel for the user will result.

Systems

Airport Surveillance Radar - Model 11

The Airport Surveillance Radar- Model 11 (ASR-11) is a digital, combined primary and secondary surveillance radar (SSR), short-range radar system with a 60 nautical mile (nmi) detection range for medium and small activity airports. The ASR-11 provides advanced digital primary radar including weather intensity surveillance with an integrated monopulse SSR system for use in the airport terminal area. The ASR-11 is used to detect and report the presence and location of an aircraft in a specific volume of airspace. The ASR-11 provides search radar surveillance coverage in controlled airspace primarily in terminal areas.

Airport Surveillance Radar - Model 7

The Airport Surveillance Radar - Model 7 (ASR-7) is a short-range (60 nm) analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the Air Traffic Control

Beacon Interrogator - Model 4 or Model 5 (ATCBI-4 or ATCBI-5) or Mode S. This system will be replaced by the ASR-11.

Airport Surveillance Radar - Model 8

The Airport Surveillance Radar - Model 8 (ASR-8) is a short-range (60 nm), analog radar system used to detect and report the presence and location of aircraft in a specific volume of airspace. It is used in conjunction with the Air Traffic Control Beacon Interrogator - Model 4 or Model 5 (ATCBI-4 or ATCBI-5) or Mode S.

Airport Surveillance Radar - Model 9

The Airport Surveillance Radar - Model 9 (ASR-9) is a short range (60 nm) radar system for the airport terminal area. The ASR-9 processes the returns from aircraft targets, which includes demodulation, analog-to-digital conversion, range and azimuth gating, sensitivity timing control, and a moving target detection function. The moving target detector includes two-level weather contour processing, digital signal processing, correlation and interpolation processing, and surveillance processing. The ASR-9 has a separate weather channel with associated processing capable of providing six-level weather contours. The two-level weather contour processing associated with the moving target detector is only be used for backup. The six-level weather channel is primarily used to supplement Next Generation Weather Radar (NEXRAD) coverage. It is normally used in conjunction with Mode Select (Mode S) but it can accommodate an Air Traffic Control Beacon Interrogator Model 4/5 (ATCBI-4/5).

The ASR-9 will be upgraded/replaced with the ASR-9/Mode S SLEP (see separate mechanism) in the 2007-12 time frame.

Automated Radar Terminal System - Model IIE

The Automated Radar Terminal System - Model IIE (ARTS IIE) provides radar data processing (RDP) and decision support tools to the controller in the terminal environment. Utilized at low to medium-size Terminal Radar Control (TRACONs) Facilities the ARTS IIE is capable of receiving input from up to 2 sensors, can process up to 256 tracks simultaneously, and support up to 22 displays. The ARTS IIE implements the Common ARTS software for improved performance maintenance efficiency. The radar data processing (RDP) software provides automated surveillance tracking and display processing. Included in the ARTS IIE software are decision support tools such as Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Mode C intruder alert, Converging Runway Display Aid (CRDA), and Controller Automation Spacing Aid (CASA).

Automated Radar Terminal System - Model IIIA

The Automated Radar Terminal System - Model IIIA (ARTS IIIA) provides radar data processing (RDP) and decision support tools to the controller in the terminal environment. Utilized at larger airports, ARTS IIIA is capable of receiving input from up to three sensors, can process up to 900 tracks simultaneously and support up to 36 displays. The RDP software provides automated surveillance tracking and display processing. Included in the ARTS IIIA software are decision support tools such as Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Mode C intruder alert, Converging Runway Display Aid (CRDA), Final Monitor Aid (FMA), and controller automation spacing aid.

Automated Radar Terminal System - Model IIIE

The Automated Radar Terminal System - Model IIIE (ARTS IIIE) consists of the hardware platform and software required providing radar data processing (RDP) and decision support tools to the controller in the terminal environment. The ARTS IIIE is used at consolidated Terminal Radar Approach Control (TRACON) facilities. The Common ARTS program provided an ARTS IIIE capable of receiving input from up to 15 sensors, the ability to process up to 10,000 tracks simultaneously, and support up to 223 displays. The RDP software provides automated surveillance tracking and display processing including mosaic display of radar data. Included in the ARTS IIIE software are decision support tools such as Minimum Safe Altitude Warning (MSAW), Conflict Alert (CA), Mode C intruder alert, Converging Runway Display Aid (CRDA), Final Monitor Aid (FMA), and controller automation spacing aid.

Automated Surface Observing System

The Automated Surface Observing System (ASOS) is an automated observing weather system sponsored by the FAA. ASOS provides weather observations, which include: temperature, dew point, wind, altimeter setting, visibility, sky condition, and precipitation. ASOS routinely and automatically provides a computer-generated voice to provide weather information directly to aircraft in the vicinity of airports using FAA very high frequency (VHF) ground-to-air radio. In addition, the same information is available through a dial-in telephone and most of the data is provided on the national weather data network.

Automatic Direction Finder

Automatic Direction Finder (ADF) - An aircraft radio navigation system which senses and indicates the direction to a L/MF nondirectional radio beacon (NDB) ground transmitter. Direction is indicated to the pilot as a magnetic bearing or as a relative bearing to the longitudinal axis of the aircraft depending on the type of indicator installed in the aircraft. In certain applications, such as military, ADF operations may be based on airborne and ground transmitters in the VHF/UHF frequency spectrum.

BSGS Broadcast Services Ground Station

The BSGS (Broadcast Services Ground Station) supports Air-Ground broadcast services. This includes the reception of ADS-B from equipped aircraft/vehicles and the transmission of Traffic Information Service-Broadcast (TIS-B) and Flight Information Service-Broadcast (FIS-B) for use by equipped aircraft. Generally, the BSGS will interface via the SDN to provide ADS-B information to ATC automation and receive TIS-B and FIS-B information from TIS-B and FIS-B servers. The BSGS includes antenna(s), one or more dual link (i.e., 1090 MHz Extended Squitter-1090ES and Universal Access Transceiver-UAT) Ground Based Transceiver(s)(GBT), processing functions and communications functions. Several configurations of the BSGS are required to support variations in the geographic service volume and functions to be supported at specific categories of operational sites. BSGSs will be installed at 448 airports and 100 en route locations. Included are those airports equipped with Secondary Surveillance Radar (SSR) and about 140 additional towered airports (currently without SSR). The BSGS will support ADS-B and TIS-B services via both the 1090ES link and by the UAT link. The BSGS will also support FIS-B via the UAT link. BSGSs incorporate a multilink gateway function that provides ADS-B rebroadcasts via the ADS-B alternate link. A BSGS incorporating 2 GBTs are required for airport surface and terminal surveillance coverage at each of 268 smaller airports, a BSGS incorporating 3 GBTs (on average) are required at 120 of the mid-sized airports, and a BSGS incorporating 6 GBTs (on average) are required at the 60 largest airport (those equipped with ASDE-X or ASDE-3 surface surveillance systems).

The following BSGS functions are required to support the various categories of NAS BSGS sites, except as noted below: (1) 1090ES and UAT receive/transmit (i.e., the GBT funnction); (2) multi-link gateway function; (3) process received ADS-B messages and output (via the SDN) ADS-B reports for use by ATC automation; (4) accept TIS-B and FIS-B information from ground TIS-B/FIS-B servers and manage the generation and broadcast of link specific TIS-B messages via the 1090ES and UAT links and FIS-B messages via the UAT link.

The following BSGS configurations are assumed based on the category of the operational site. Except as noted below all BSGS configuration support the above described functions.

En route (100 sites): (1) One multi-sector antenna with each sector connected to the individual 1090ES and UAT receivers. Supports up to 250 nmi. ADS-B reception. En route locations that are intended to provide only low-altitude gap filler coverage do not require the long-range capability. (2) One omni-directional transmit antenna. Transmitter power sized to support the required TIS-B and FIS-B coverage for that specific site.

Terminal/Airport without ASDE-X (415 airports incl. 27 ASDE-3 equipped airports) with each site having: (1) BSGS with at least 2 GBTs with omni-directional antennas sited for both airport surface and terminal airspace coverage; (2) additional GBTs as needed to provide coverage of the primary airport surface movement area.

Terminal/Airport with ASDE-X (26 ASDE-X plus 7 upgraded ASDE-3 airports with an average of 6 GBTs per BSGS): (1) ASDE-X ground stations upgraded to support GBT functionality; (2) At least two of the GBTs provide ADS-B coverage to the edge of the terminal airspace and the TIS-B coverage; (3) ASDE provides the surveillance data source to support TIS-B for surface traffic.

Backup Emergency Communications

Back Up Emergency Communications (BUEC) provides a secondary A/G communications path for the en route environment, giving each controller access to another completely diverse radio channel. The original system, previously employed at all 20 CONUS ARTCCs, uses a limited number of tunable transceivers that are shared by a greater number of controllers through a priority system at the ARTCC.

The old BUEC is being replaced with dedicated BUEC channels on a one per sector basis to solve a serious supportability problem with the 30+-year-old system and to provide each controller with improved back up radio coverage. The new BUEC outlets have been sited for best coverage for the sectors"" service volumes that because of size require multiple RCAGs for coverage will have multiple BUEC sites. The program has no prime contractor. All activities including site selection, engineering, site preparation, transition, and testing are performed by the ANI and regional personnel. The Product Team provides equipment and funding for implementation. The new BUEC system employs the same equipment as the RCAGs.

Backup Emergency Communications Replacement

The Backup Emergency Communications (BUEC) Replacement (BUEC Repl) mechanism replaces existing analog BUEC system with an updated analoq BUEC system. Also provides backup for Remote Communications Air-Ground Facility (RCAG) very high frequency (VHF) and ultra high frequency (UHF) communications channels (radio equipment) that are available to an Air Route Traffic Control Center (ARTCC) for immediate use if one or more primary RCAG frequencies fail. The system consists of remotely controlled equipment, and several VHF and UHF transceivers. A typical BUEC system may provide as many as 60 VHF and UHF transceivers for an ARTCC.

Conference Control System

The Conference Control System (CCS) is a replacement system for the legacy Operational Telephone System (OTS). The CCS is a telecommunications conferencing system that provides voice connectivity, switching, and teleconferencing capabilities for the Traffic Management Specialists and the NAS Operations Manager, at the FAA Air Traffic Control System Command Center (ATCSCC) in Herndon, VA. CCS enables communication from ATCSCC to Traffic Management Units (TMUs) at ARTCC and TRACONS, the Severe Weather Group at ARTCCs, FAA Regional Offices, FAA Headquarters, Airline Operations Centers (AOCs), and the general aviation community.

Digital Voice Recorder System Replacement

The Digital Voice Recorder System Replacement (DVRS Replacement) is a modern digital system used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

Distance Measuring Equipment

Distance Measuring Equipment (DME) is a UHF (Ultra High Frequency) ground-based radio navigation aid. DME avionics transmit interrogation pulses, and the ground-based responder sends a reply. The avionics process the reply and determine the slant range between the aircraft and the ground station. Separate funding segments and acquisition projects have been established for two generic classes of DME ground stations: High power (en route) DMEs, and low power (terminal) DMEs. This mechanism addresses the high power DMEs.

DMEs may be provided alone, but are more often collocated with a VOR to form a VOR/DME facility, allowing aircraft to determine both the bearing and slant range to the ground station - and hence a navigational position fix. DMEs are approved as a primary navigation system in the NAS. The DME function is frequently provided by the TACAN system that also provides azimuth guidance to military users. (DME and the distance-measuring portion of TACAN are functionally the same.) When combined with a VOR, these facilities are called VORTACs.

The DME network will be sustained to support en route navigation and to serve as an independent backup navigation source to GPS and GPS/WAAS. The DME network may also need to be expanded to provide a redundant area navigation (RNAV) capability for terminal area operations at major airports.

Distance Measuring Equipment Avionics

Distance Measuring Equipment Avionics (DME Avionics) receives, processes and displays for the pilot the distance data provided by ground-based DMEs.

Enhanced Terminal Voice Switch

The Enhanced Terminal Voice Switches (ETVS) are installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) facilities with more than four air traffic controller positions. The ETVS is a modular system.

The size of the switch is based on the number of controller positions in the facility.

The ETVS (installed in the ATCT) provides the ATC operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the ETVS.

The ETVS (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within a TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the ETVS.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate ETVS systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

FAA Telecommunications Infrastructure

The FAA Telecommunications Infrastructure (FTI) services will replace most FAA-owned and leased telecommunications systems/services and consolidate their functions under a single service provider. The FTI contract will provide services that will meet current and future telecommunications requirements while reducing operational cost.

FTI is implemented in two phases. Phase 1 focuses on establishing an Internet Protocol (IP) backbone among 27 sites that includes ARTCCs, ATCSCC, Volpe, Aeronautical Center, WJHTC, and the two NADIN NNCC''s. Its primary goal is to transition 25 major nodes from the LINCS network. Phase 2 transitions circuits from DMN, BWM, NADIN PSN, and any remaining LINCS circuits.

FTI is a 15-year contract beginning in FY 2002 and ending in FY 2017.

Federal Telecommunications System 2001

Federal Telecommunications System 2001 (FTS 2001) provides for a follow-on lease for Federal Telecommunications System 2000 functions. The telecommunications service contract that will provide administrative and National Airspace System (NAS) telecommunications support for the FAA. FTS 2001 will provide long distance voice, facsimile, video, and data services.

Flexible Voice Switch

Voice communications is the primary means of communications among ATC facilities and between an Air Traffic Control Specialist (ATCS) and a pilot. Voice switching provides the ATCS both G/G Interfacility/Intrafacility and A/G voice communications connectivity. The NAS Voice Switch (NVS) program will replace aging voice switches and their analog interfaces with modern digital voice switches consisting of digital interfaces. The Flexible Voice Switch will be the common platform and baseline voice switch for all NAS domains with modularity and scalability to meet communications connectivity requirements. Additionally, this switch will be expandable to accommodate growth capacity requirements and able to support NAS Modernization needs as described in various Operational Improvements.

Flight Data Input/Output

The Flight Data Input/Output (FDIO) system provides flight progress information for use by the Tower, Terminal Radar Approach Control (TRACON) and Air Route Traffic Control Center (ARTCC) controllers. The FDIO system allows Air Traffic Control (ATC) Specialists to input automated flight data, perform data manipulation, and print flight strips.

Flight Management System

Flight Management System (FMS) is a computer system that uses a large database to allow routes to be preprogrammed and stored. The system is constantly updated with respect to position accuracy by reference to one or more conventional radio navigation aids (i.e., multi-sensor systems). The system may also use information from an inertial reference unit (IRU) or from a stand-alone inertial navigation system (INS). A sophisticated program and its associated database ensure that the most appropriate navaids are automatically selected during the update cycle. FMSs combine the relative position information from two or more point-referenced navigation aids such as VOR or DME to determine the absolute position of the aircraft (latitude, longitude). The resulting Area Navigation (RNAV) capability permits operation on any desired course.

Flight Object Management System - Terminal (key system)

The FOMS is a component of the Standard Automation Platform (SAP). The FOMS processes flight data received from multiple sources via the System Wide Information Management (SWIM) Management Unit. The FOMS also receives track data from the Surveillance Data Processor (SDP) and associates tracks with flight data, producing the flight object, which is published to SWIM for subscriber use. Flight plan support functionality includes end-to-end profile evaluation in all phases of flight and evaluation against static and dynamic constraints (terrain, obstacles, airspace restrictions, etc.). The FOMS supports flight planning up to 180 days prior to day of flight. A user can access the flight object from initial to closeout in the same manner. The FOMS provides end-to-end flight data management from preflight to post analysis. Ownership of the flight object begins and ends with Traffic Flow Management and transitions during the flight to clearance delivery, ramp, surface, departure, transition to cruise, cruise, transition to arrival, and ramp. Flight data management is based on trajectory, assigned volumes, and "necessary" route structure.

General Weather Processor (key system)

The GWP collects, analyzes, tailors, displays, and distributes weather products. The GWP receives weather data from multiple sensors and distributes processed and tailored weather information via System Wide Information Management. The GWP provides a standard set of algorithms and access to data/products that convey current and future status of impacting weather to all National Airspace System services.

Global Positioning System

The Global Positioning System (GPS) is a worldwide, all-weather, satellite-based navigation system developed, maintained & operated by the U.S Department of Defense, and managed by an Interagency executive board. GPS is a (nominal) 24 satellite constellation orbiting at approximately 12,000 miles above the earth in six planes. Each satellite broadcasts a precisely timed L-band signal on the same frequency. User GPS receivers, oboard aircraft, in ground vehicles or hand-held, receive and process the signals from all satellites in view, with a minimum of four satellites necessary to determine the receiver''s three-dimensional position (i.e., latitude, longitude and altitude), velocity (if applicable) and the precise time of day. GPS equipped aircraft can navigate on published jetways or utilize Area Navigation (RNAV) to fly any desired course between two locations.

GPS avionics built to TSO C-129 support en route and terminal area navigation, as well as non-precision instrument approach operations. Approval has been granted for properly certified GPS avionics to be used as a primary means of navigation in oceanic airspace and in certain remote areas. In July 2003 the Wide Area Augmentation System (WAAS)was commissioned to augment the GPS signal to meet primary navigation service requirements for accuracy, coverage, availability, and integrity.

Global Positioning System Avionics

Global Positioning System (GPS) Avionics process the signals received from four or more GPS satellites and determine the three-dimensional position (i.e., latitude, longitude and altitude) and velocity of an aircraft, as well as the precise time of day. GPS avionics provide an Area Navigation (RNAV) capability that permits operation on any desired course.

GPS avionics built to TSO-C129 do not have augmentation (WAAS, LAAS) and are approved only as a supplemental navigation system in the NAS, meaning that they must be used in conjunction with a primary navigation system. TSO-C129 avionics support en route and terminal area navigation, as well as non-precision instrument approach operations. Approval has been granted for properly certified GPS avionics to be used as a primary means of navigation in oceanic airspace and in certain remote areas. In certain regions of the world (including the NAS), GPS will be augmented (Wide Area and Local Area systems) to satisfy additional requirements for accuracy, coverage, availability, and integrity. Augmented GPS avionics (WAAS, LAAS) are expected to support precision instrument approach operations, and to gain approval as a primary navigation system throughout the NAS. It is anticipated that users will migrate from TSO-C129 avionics to augmented GPS avionics (WAAS, LAAS).

High Frequency Airborne Radios

High Frequency (HF) Airborne Radios are analog (HF multi-channel radio transceivers operating in the 2 - 30 Mhz frequency band installed in airborne commercial, cargo, and military aircraft transiting the oceanic, en route, terminal, or flight service station airspace domains. These transceivers are typically used in transoceanic applications.

High Frequency Ground Radios

High Frequency (HF) Ground Radios are analog HF radio devices operating in the 2 - 30 Mhz frequency band, which may be single channel transmitters and receivers or multi-channel transceivers. These radio devices are installed at oceanic and en route facilities and used to support tactical air traffic control (ATC) voice communications between a ground controller and a pilot in an aircraft in the oceanic domain. Additionally, these devices are also installed at regional facilities and used to support voice command and control communications /coordination in emergency or during disaster recovery situations occurring in the NAS.

Inertial Navigation System Avionics

Inertial Navigation System Avionics (INS Avionics) is a self-contained system, comprised of gyroscopes, accelerometers, and a navigation computer, which provides navigation information in response to inertial effects on system components. An INS is typically aligned with accurate position information prior to departure, and thereafter calculates its position as it progresses to the destination. INS accuracy degrades with time, but can be aligned in flight using radio navigation system updates. Many inertial systems employ a sophisticated automatic update scheme using dual- Distance Measuring Equipment (DME), very high frequency (VHF) Omnidirectional Range VOR or other sensor inputs (e.g., Global Positioning System (GPS)).

INS may be approved as a primary navigation system or may be used in combination with other systems. By programming a series of waypoints, the system will navigate along a predetermined track. INS provides an Area Navigation (RNAV) capability that permits operation on any desired course.

Integrated Communications Switching System Type I

The Integrated Communications Switching System Type I (ICSS I) are installed at Airport Traffic Control Towers (ATCT), Terminal Radar Approach Control (TRACON) facilities, and Automated Flight Service Stations (AFSS).

The ICSS I (installed in the ATCT) provides the air traffic control (ATC) operational ground-ground voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/air traffic control system command center (ATCSCC) specialists. Ground-air radio connectivity between ATCT controllers and pilots is also supported by the ICSS I.

The ICSS I (installed in the TRACON) provides the ATC operational ground-ground voice communications interconnectivity between controllers within TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Ground-air radio connectivity between TRACON controllers and pilots is also supported by the ICSS I.

The ICSS I (installed in the AFSS) provides the ATC operational ground-ground voice communications interconnectivity between specialists within an AFSS (intercom), interconnectivity between specialists in separate AFSSs (interphone), and interconnectivity between Flight Service Station (FSS) specialists and Air Route Traffic Control Center (ARTCC) controllers/TRACON controllers/ATCT controllers/Air Traffic Control System Command Center (ATCSCC) specialists. Ground-air radio connectivity between AFSS specialists and pilots is also supported by the ICSS I.

Integrated Information Workstation - Build 1 (key system)

IIW Build 1 will include the infrastructure and system interfaces to acquire, analyze, store, update, display, and manage the following information in an integrated manner: (1) National Airspace System (NAS) aeronautical, (2) airport environmental, (3) airborne and surface surveillance, (4) flight information, (5) weather information, and (6) NAS status. Build 1 will also replace its predecessor system, FAA Data Display System, as well as interface with the following systems in support of its mission: Flight Object Management, System Wide Information Management, Next Generation- Traffic Flow Management, Maintenance Management System, Unified Decision Management System, and Aeronautical Information Management.

Integrated Terminal Weather System

The Integrated Terminal Weather System (ITWS) functions as a weather server in the terminal domain. It acquires data from FAA and National Weather Service (NWS) sensors as well as from aircraft in flight in the terminal area. The ITWS will provide aviation-oriented weather products to Air Traffic Control (ATC) personnel that are immediately usable without further meteorological interpretation.

Leased Inter-facility National Airspace System Communication System

The Leased Inter-facility National Airspace System Communication System (LINCS) provides transmission channels of various industry-standard types between any specified end points, used to satisfy all FAA operational and some administrative telecommunication requirements.

Loran-C

Loran-C is a low frequency (LF), long-range, ground-based radionavigation aid operated by the U.S. Coast Guard. Loran-C avionics measure the time difference between signals received from three or more ground stations and determine the two-dimensional position (i.e., latitude and longitude) and velocity of the aircraft. Loran-C avionics provide an Area Navigation (RNAV) capability that permits operation on any desired course within the coverage area of the stations being used.

Loran-C is currently approved as a supplemental system in the National Airspace System (NAS), meaning that it must be used in conjunction with a primary system. Current Loran-C avionics support en route navigation but do not support instrument approach operations.

Operation of Loran-C beyond 2008 will be based upon a determination by the Department of Transportation and the Department of Homeland Security whether the system is needed as a backup to GPS for transportation and timing applications.

Loran-C Avionics

Loran-C Avionics receive, process, and display to the pilot the latitude and longitude of the aircraft""s current position, based on data received from ground-based equipment.

Loran-C is currently approved as a supplemental system in the NAS, meaning that it must be used in conjunction with a primary system. Current Loran-C avionics support en route and terminal area navigation but do not support instrument approach operations. System operation beyond 2008 depends upon analysis by FAA and USCG to ascertain ability to support aviation nonprecision approach operations and maritime harbor entrance & approach operations.

Low Power Distance Measuring Equipment

Distance Measuring Equipment (DME) is an Ultra High Frequency (UHF) ground-based radio-navigation aid. DME avionics reply to interrogations from the ground station, which is capable of processing replies from over 100 aircraft at one time. The DME determines the time between an interrogation and a reply to determine the slant range between them.

Acquisition projects have been established for two generic classes of DME ground stations: high power and low power. High power DMEs (HPDMEs)are rated at 1kw and are located to support enroute navigation. HPDMEs are typically co-located with VHF OmniRange systems, forming what is termed a VOR/DME facility. Low power DMEs (LPDMEs) are rated at 100w and are located to support terminal area navigation such as ILS approaches.

LPDMEs are installed with many ILS facilities. When specified in the ILS approach procedure, DME may be used in lieu of the outer marker, as a back-course final approach fix, or to establish other fixes on the localizer course. LPDMEs are also installed with some localizer-only (LOC) facilities. Additional LPDMEs are being installed to support ILS approaches as recommended by the Commercial Aviation Safety Team (CAST).

Multi-Mode Digital Radios

Multi-Mode Digital Radios (MDRs) are ground-based Very High Frequency (VHF) air-traffic-control radios that can operate in several configurations: 1) analog voice with 25kHz channel spacing; 2) analog voice with 8.33 kHz channel spacing; and 3) VHF Data Link (VDL) Mode-3 which consists of two-way digital voice and data communication.

Power Systems

The Power Systems (Pwr Sys) mechanism provides for the conditioning of commercial power, including uninterruptible power systems (UPS), to eliminate voltage dropouts, surges, and voltage sags caused by sources outside the facility. Power distribution, grounding, bonding and shielding of electrical system within the facility is also part of the Pwr Sys.

The Power Systems (Pwr Sys) mechanism provides the following: 1.) ACEPS Busway Replacements, 2.) ACEPS EG Maintenance, 3.) ACEPS Monitoring & Diagnostics, 4.) ACEPS Fuel System Upgrade, 5.) ACEPS Training, 6.) Battery Monitoring, 7.) Training Facility, 8.) CPDS, 9.) Battery Replacements, 10.) DC Systems, 11.) EG, 12.) LPGBS, 13.) Power Cable, 14.) UPS, 15.) Contract Support.

Radio Communication Link

Radio Communication Link (RCL) is an integrated voice and data microwave transmission system designed to provide the FAA with cost effective and reliable service for its high capacity NAS communications routes. RCL interconnects air route traffic control center (ARTCC) facilities with long range radar installations and other air traffic control (ATC) facilities.

Radio Control Equipment

Radio Control Equipment (RCE), located at both ATC facilities and remote communication sites, control the operation of remotely located ground to air Very High Frequency/Ultra High Frequency (VHF/UHF) radios used by air traffic controllers to communicate with pilots. RCE interfaces with the voice switch at the ATC facility, telephone landlines, and ground to air radios at the En Route Remote Communications Air/Ground (RCAG) sites, Terminal Remote Transmitter/Receiver (RTR) sites, and Flight Service Station Remote Communications Outlet (RCO) sites.

Rapid Deployment Voice Switch Type I

The Rapid Deployment Voice Switch Type I (RDVS I) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The

RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS I (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the RDVS I. The RDVS I (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the RDVS I.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS I systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Rapid Deployment Voice Switch Type II

The Rapid Deployment Voice Switch Type II (RDVS II) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS II (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the RDVS II. The RDVS II (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the RDVS II.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS II systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Rapid Deployment Voice Switch Type IIA

The Rapid Deployment Voice Switch Type IIA (RDVS IIA) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS IIA (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. The RDVS IIA also supports air-to-ground (A/G) radio connectivity between ATCT controllers and pilots. The RDVS IIA (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between TRACON controllers and pilots is also supported by the RDVS IIA.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS IIA systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Small Tower Voice Switch

The Small Tower Voice Switch (STVS) is installed in small Airport Traffic Control Towers (ATCT) and in Flight Service Stations (FSS). The basic STVS has four operator positions. The STVS provides the Air Traffic Control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and Air Route Traffic Control Center (ARTCC) controllers/ Terminal Radar Approach Control (TRACON) controllers/FSS specialists/air traffic control system command center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the STVS. The STVS (installed in the FSS) provides the ATC operational G/G voice communications interconnectivity between specialists within an FSS (intercom), interconnectivity between specialists in separate FSSs (interphone), and interconnectivity between FSS specialists and Air Route Traffic Control Center (ARTCC) controllers/Terminal Radar Approach Control (TRACON) controllers/ATCT controllers/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground radio connectivity between FSS specialists and pilots is also supported by the STVS.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate STVS systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Standard Automation Platform Convergence Phase 1 (key system)

The purpose of Standard Automation Platform Convergence Phase 1 (SAP Conv P1) is to reduce both procurement and recurring costs by standardizing and sharing as many hardware and software ATC Automation components as possible.

An engineering convergence task will begin in fiscal year 2005 and run through 2015. All components from each of the automation systems (STARS, ERAM, TFM, etc.) will be analyzed, and the "best of breed" and "core" components will be selected. SAP convergence will be performed in the following areas: (1) Hardware; (2) System Software (operating systems, Commercial-Off-The-Shelf tools, etc.); (3) ATC applications that can be shared across domains; (4) ATC applications that are unique to a domain; and (5) ATC system support tools that can be shared across domains (adaptation, data extraction or systems analysis recording, data reduction and analysis tools, etc.). Proven STARS and ERAM components will be slected, integrated into the SAP, and rigorously tested for replacing STARS and ERAM components at or near their end of service life.

Prototyping begun under Phase 1 will continue with SAP Conv P2. The results of both efforts will lead to refining the requirements to develop the SAP WS mechanism with SDP and FOMS applications.

Standard Automation Platform Workstation Phase 1 (key system)

The SAP consists of the Flight Object Management System (FOMS), the Surveillance Data Processor (SDP), and the SAP Workstation. The SAP will be installed in En Route and Arrival/Departure facilities. The SDP performs surveillance data processing and tracking on Surveillance Data Objects received from the Surveillance Data Network. The FOMS performs flight plan processing, associates flight and track data, and publishes the Flight Object on the System Wide Information Management network. The SAP workstation provides the controller interface for the FOMS and SDP.

Surveillance Data Processor (key system)

SDP is a component of SAP and operates in En Route and Terminal. The SDP will make improvements to sensors and automation systems that will allow for expanded use of 3-mile separation and terminal procedures. The operational improvements enable more efficient control of aircraft and use of airspace. To accomplish this, all 1030/1090 Beacon interrogators will be upgraded to disseminate their existing 1.2 milli-radian azimuth accuracy and other information, such as time of measurement, confidence, quality, and so on. The automation system algorithms will be improved or new algorithms will be developed to exploit the additional information content of the improved surveillance reports. The method of presentation (display) to support 3-mile separation will be developed and tested to ensure safety. The existing long-range sensor surveillance update period is (12 seconds) and is insufficient to support 3-mile separation. In areas where only long-range sensors exist and where the Air Traffic Service requires 3-mile separation, these sensors may be modified to double the update rate to achieve 3-mile separation.

System Wide Information Management Build 1B

Build 1B provides all items in 1A, including more NAS information. This build integrates Flight and Surveillance Information systems into the SWIM architecture.

Tactical Air Navigation System

Tactical Air Navigation (TACAN) is a UHF (ultra high frequency) ground-based radio navigation aid that is the military counterpart of VHF Omnidirectional Range co-located with Distance Measuring Equipment (VOR/DME). TACAN avionics provide both the bearing and slant range to the ground station - and hence a navigation position fix. TACAN is often collocated with civil VOR systems to form a VORTAC to support military aircraft operations. TACAN is approved as a primary navigation system in the National Airspace System (NAS).

Ultra High Frequency Airborne Radios

The Ultra High Frequency Avionics (UHF Avionics) are analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225-400 MHz frequency band, which are multi-channel transceivers, installed in an airborne military platform. These airborne devices support the tactical two-way voice communications/ coordination between the military pilot in the military aircraft and the controller on the ground.

Ultra High Frequency Ground Radios

Ultra High Frequency (UHF) Ground Radios are analog UHF amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 Mhz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and flight service station domains.

Ultra High Frequency Ground Radios - Replacement

The Ultra High Frequency Ground Radios - Replacement (UHF Ground Radios - Repl) mechanism represents analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 MHz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and Flight Service Station domains.

Very High Frequency Airborne Radios

Very High Frequency (VHF) Airborne Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 Mhz frequency band which are multi-channel transceivers installed in an airborne platform (e.g., commercial, cargo, and general aviation aircraft). These airborne devices support the tactical two-way voice communications/coordination between the pilot in the aircraft and the controller on the ground.

Very High Frequency Data Link - 2 Avionics

Very High Frequency Data Link - 2 Avionics (VDL-2 Avionics) consist of airborne radios operating in the very high frequency (VHF) range that receive and transmit data using a low-speed, bit-oriented protocol and Carrier Sense Multiple Access (CSMA).

Very High Frequency Ground Radios

Very High Frequency (VHF) Ground Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 MHz frequency band which are single-channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the pilot in commercial, cargo, or general aviation aircraft in the oceanic, en route (i.e., ARTCC), terminal (i.e., TRACON/tower), and flight service station domains. Additionally, there are analog VHF frequency modulation (VHF - FM) radio devices operating in the 161 - 174 MHz frequency band that are multi-channel transceivers. These transceivers are used by flight inspection, aviation security, and airway facility specialists supporting local airport operations and maintenance or to perform their operational maintenance mission in support of the NAS. However, these same VHF-FM transceivers are also used to support the resolution of emergency situations or establish a level of voice command and control communications/coordination during disaster recovery.

Very High Frequency Multi-Mode Airborne Radios

Very High Frequency Multi-Mode Airborne Radios (VHF MM Airborne Radios) refers to an airborne radio operating in the very high frequency (VHF) range capable of operating in the following modes: (1)) analog voice (i.e., 25 kHz spacing for use in the United States and other similarly equipped countries); (2) VHF Digital Link Mode 2 (VDL Mode-2) (two-way digital data transmission); (3) VHF Digital Link Mode 3 (VDL Mode-3), (integrated two-way digital voice/data transmission); and (4) analog voice (i.e., 8.33 kHz spacing for use in Europe and other similarly equipped countries).

Very High Frequency Omnidirectional Range

The Very High Frequency Omnidirectional Range (VOR) is a ground-based radio navigation aid that broadcasts azimuth information to aircraft. VORs broadcast on assigned channels and include the facility identification in Morse code for pilot monitoring and verification. Some VORs are capable of broadcasting weather information and supporting pilot-controller communcations although these capabilities are typically provided by other infrastructure systems. In addition to providing en route and terminal area azimuth guidance, VORs also support nonprecision instrument approach operations.

Currently, VORs are the primary radio navigation aid in the National Airspace System (NAS). They serve as the internationally designated standard short-distance radio navigation aid for air carrier and general aviation Instrument Flight Rules (IFR) operations.

VORs may be installed stand-alone or co-located with either a DME or TACAN system. When co-located the facility is typically referred to as a VOR/DME or VORTAC facility, respectively. This configuration allows pilots to determine their aircraft''s bearing and distance to a single location, i.e., fix.

With the advent of space-based navigation capabilities, a planned reduction in operational VORs will begin in approximately 2010. The reduction will result in a "backbone" minimum operational network (MON) that will support IFR operations at the busiest airports in the NAS while serving as a backup for space-based navigation.

Very High Frequency Omnidirectional Range Avionics

Very High Frequency Omnidirectional Range Avionics (VOR Avionics) receive, process, and display for the pilot the azimuth (bearing) to or from ground-based VOR transmitters.

Increasing numbers of aircraft are being equipped with GPS or WAAS avionics. However, since a reduced network of VOR stations is planned to continue in operation indefinitely as a backup to GPS, VOR avionics are expected to remain in service indefinitely in some aircraft.

Very High Frequency Omnidirectional Range Replacement

The Very High Frequency Omnidirectional Range (VOR) system is a ground-based radio navigation aid that broadcasts navigation signals, 360 degrees in azimuth, oriented from magnetic north, plus a periodic Morse code identification signal. VOR avionics indicate the azimuth (bearing) to or from the VOR transmitter. Some VOR stations are used for the broadcast of weather information. Air Traffic Control (ATC) or Flight Service Station (FSS) specialists may use the voice features for transmitting instructions or information to pilots.

VOR is the primary radio navigation aid in the National Airspace System (NAS) and is the internationally designated standard short-distance radio navigation aid for air carrier and general aviation Instrument Flight Rules (IFR) operations. Because it forms the basis for defining the airways, its use is an integral part of the ATC procedures. In addition to providing en route and terminal area guidance, VORs also support nonprecision instrument approach operations.

VORs may be provided alone, but are more often collocated with either a DME or TACAN system to form a VOR/DME or VORTAC facility, allowing aircraft to determine both the bearing and distance to the ground station - and hence a navigational position fix.

The number of VOR systems shown herein includes all systems whether stand-alone or co-located with an NDB, DME or TACAN system.

A reduction in the VOR (only) population is expected to begin in 2010. The proposed reduction will transition from todays VOR services to a minimum operational network (MON) that will support IFR operations at the busiest airports and serve as an independent backup navigation source to GPS and GPS/WAAS. Those VORs that remain in service will need to be replaced or SLEPd, as portrayed in the quantities depicted in this mechanism.

WAAS Corrections Broadcast Service

WAAS Corrections Broadcast Service is comprised of both Space-based and Ground Earth Station components.

Geostationary Earth Orbit (GEO) satellites receive Wide Area Augmentation System (WAAS) correction and integrity information transmitted by Ground Earth Stations (in WAAS terms referred to as Ground Uplink Stations (GUSs)) with information re-broadcast for WAAS avionics reception and use. Current broadcast service leased from INMARSAT".

Wide Area Augmentation System

The Wide Area Augmentation System (WAAS) consists of a distributed array of Reference and Master Stations designed to provide range correction and integrity information messages that are used by WAAS-capable Global Positioning System (GPS)avionics to accurately determine an aircraft''s 3-dimensional position in space. Accurately surveyed WAAS Reference Stations (WRS) receive and process GPS satellite range data which is forwarded to redundant WAAS Master Stations (WMS) for additional processing before sending the resulting range-correction data to redundant WAAS Ground Uplink Stations (GUS). The GUS transmit the data to Geostationary (GEO) satellites which retransmit them on a GPS civil-use frequency for reception by GPS/WAAS avionics. The WAAS data enables aircraft to determine their position in the airspace with an accuracy that will enable, for WAAS-equipped aircraft, introduction of advanced navigation initiatives such as precision and non-precision approaches to airports throughout the NAS, and reduced longitudinal separation.

The WAAS service volume includes the contiguous United States, Hawaii, portions of Alaska and the Caribbean, and the

US border areas with Canada and Mexico. Planned enhancement of WAAS with additional WRS and GEO satellites will improve the coverage and availability of WAAS. Enhancement of the GPS by the Department of Defense (DoD) will provide a second civil frequency for WAAS that will provide additional improvements in navigation performance throughout the NAS. This latter version of the WAAS will be termed the GPS Landing System (GLS).

Wide Area Augmentation System Technology Refresh

Elements of WAAS technical refresh consist of two paths. One is improvement to operational capability that enhances performance of WAAS. The other is the known replacement of equipment, including hardware, software, and telecommunications links and networks within the WAAS WMS and GUS.

Technical refresh is subject to "re-baselining" activity that is currently underway and the FAA will make a corporate decision in September 2004.

Support Activities

AT Procedure Development for Optimal Runway Planner - Terminal

Air Traffic Procedures document air traffic services and how they are implemented. The introduction of new systems, or changes to existing systems, may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

AT Training for Optimal Runway Planner - Terminal

Air Traffic (AT) training is provided to the AT workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AT Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

FAA Rulemaking for Optimal Runway Planner - Terminal

FAA Rulemaking is necessary when Federal Air Regulations require or change the delivery of NAS services. The regulatory process must be complete prior to implement or service provision. The lead time for change vary greatly due to the varieties of scope but will take a minimum of 180 days before implemented.

FAA Spectrum Engineering for Optimal Runway Planner - Terminal

FAA Spectrum Engineering ensures that radio frequency spectrum is available before developing or procuring new communications-electronics systems.

FAA Standards for Optimal Runway Planner - Terminal

FAA standards development is an activity necessary to support people and systems in the delivery of NAS services. FAA Standards establish rules for the measure of quantity, weight, extent, value, or quality.

People

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Planning Controller

A Planning Controller performs the following activities: Ensure separation; Initiate control instructions; Operate interphones; Conduct air/ground communications via data link; Coordinate tactical traffic flows; Scan flight data; Correlate with situation data; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the tactical controller when aware of those instructions.

Radar Associate Controller

A Radar Associate Controller performs the following activities: Ensure separation, initiate control instructions; operate interphones; Accept and initiate non-automated handoffs; and ensure radar controller is made aware of the actions; Assist the radar controller by accepting or initiating automated handoffs/pointouts which are necessary for the continued smooth operation of the sector, and ensure that the radar controller is made immediately aware of any action taken; Coordinate, including pointouts; Monitor radios when not performing higher priority duties; Scan flight progress strips; Correlate with radar data; Manage flight progress strips; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the radar controller when aware of those instructions.

Radar Controller

A Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate automated handoffs; Assist the radar associate controller with non-automated handoff actions when needed; Assist the radar associate controller in coordination when needed; Scan radar display; Correlate with flight progress strip information; Ensure computer entries are completed on instructions or clearances you issue or receive; Ensure strip marking is completed on instructions or clearances you issue or receive.

Tactical Controller

A Tactical Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios and data link; Oversee data link communications by the associate tactical controller; Accept and initiate automated handoffs; Assist the planning controller with non-automated handoff actions when needed; Assist the planning controller in coordination when needed; Scan the situation display; Correlate with flight data; Ensure computer entries are completed on instructions or clearances you issue or receive.

Traffic Management Specialist

Traffic Management Specialists perform the following activities: Balance air traffic demand with the airspace's capacity to maintain maximum and efficient utilization of the NAS; Coordinate and implement traffic management directives if needed for area of responsibility; Monitor and balance traffic flows within the area of responsibility in accordance with traffic management directives; Evaluate effectiveness of traffic management directives and make necessary adjustments; Document delay information.

Interfaces

Flight Object Management System - Terminal ← (Data Communication) → Integrated Information Workstation - Build 1

FOMS sends traffic management decision support tool information to IIW. IIW serves as the controller interface to the tools.

Flight Object Management System - Terminal — (Flight Data) → Standard Automation Platform Workstation Phase 1

FOMS provides the flight object to the SAP WS for display to the controller.

Surveillance Data Processor — (Track Data) ➔ Flight Object Management System - Terminal

SDP sends correlated surveillance data to FOMS for further processing, including association with flight data.

Surveillance Data Processor — (Surveillance Data) ➔ Standard Automation Platform Workstation Phase 1

The SDP sends surveillance data to the SAP WS for display to the controller.

Issues

none identified

Service Group Air Traffic Services

Service TM-Synchronization

Capability Airborne

Operational Improvement

Provide Conflict Probe with Multi-Objective Data Linked Resolutions (104105)

Conflict Probe improvements enhance controllers ability to accommodate pilot requests for flight plan changes by providing conflict detection and trial planning in en route operations.

31-Jan-2016 to 30-Jun-2024

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

The future conflict probe includes two system changes that increase conflict-probing efficiency. Many of the changes in trajectory are coordinated on a strategic basis via data link with the flight deck. This provides greater accuracy in projecting future positions based on agreements captured with the Flight Object Management System (FOMS), not on trial-and-error assumptions, to overcome verbally delivered deviations from the clearance. Automated dependent surveillance-broadcast (ADS-B) messages with velocity vectors and next waypoint(s) information provide data used for conformance monitoring and improving along-track estimates.

Also available to the conflict probe are both tactical and strategic-flow initiatives being exercised on individual flight trajectories. This removes the need for the service provider to integrate the various pictures for trial resolution identification and trial planning. This integration of objectives means that the automation can support the service provider by suggesting alternative resolutions that not only remove the separation conflict, but also adhere, if possible, to all known flow constraints. The conflict probe can support both tactical and near-tactical separation and flow objectives. It may be used by either the tactical or strategic control function.

Conflict probe tools are integrated into the Flight Object Management System. The advanced capabilities for prediction, based on changing the interaction between ground and aircraft and increased availability of intent data, mean that the service provider can be more judicious in deciding to declare conflict and move aircraft from their cleared path. These capabilities, coupled with increased knowledge of other constraints, ensure that an aircraft will only be moved once, and only to the degree to meet all know constraints. This reduces the number and severity of service provider-assigned deviations.

Benefits

The future conflict probe increases efficiency of airspace use in the en route domain. It assists in synchronizing en route traffic by identifying potential separation violations, both aircraft/aircraft and aircraft/airspace, early enough to avoid them. This results in better management and balance of the sector-traffic capacity. The conflict probe also improves the controller□s ability to accommodate pilot requests for flight plan changes, thereby enabling the user to fly the most desirable route. This, in turn, reduces delays and costs to the user. User-requested reroute percentage being granted will increase saving time and fuel.

Systems

Air Route Surveillance Radar - Model 3

The Air Route Surveillance Radar - Model 3 (ARSR-3) is a 1980s radar that provides primary long range surveillance data, including slant range and azimuth data. It processes the returns which includes demodulation, analog-to-digital conversion, moving target indicator function, sensitivity time control, range and azimuth gating, and digital target extraction - all of which are performed digitally (with the exception of the demodulation and analog-to-digital conversion). In addition, the ARSR-3 has a weather channel with associated processing to provide weather contour information in digital format.

Air Route Surveillance Radar - Model 4

The Air Route Surveillance Radar - Model 4 (ARSR-4) is a three-dimensional, long-range, rotating phased array, primary surveillance radar with integrated height finder capability. It is part of the joint surveillance system (JSS) used in conjunction with ARSR-3 coverage as part of the nationwide air defense command surveillance network. In addition to functions peculiar to the military, the ARSR-4 performs the same basic functions of the ARSR-3, by providing primary long-range surveillance data, including slant range and azimuth data.

Air Traffic Control Beacon Interrogator - Model 4

The Air Traffic Control Beacon Interrogator - Model 4 (ATCBI-4) is an air traffic control (ATC) beacon system that interrogates transponder-equipped aircraft. It is a secondary radar system that interrogates transponders, receives aircraft identification, and determines position data.

Air Traffic Control Beacon Interrogator - Model 5

The Air Traffic Control Beacon Interrogator - Model 5 (ATCBI-5) is an air traffic control (ATC) beacon system that interrogates transponder-equipped aircraft. It is a secondary radar system that interrogates transponders, receives aircraft identification, and determines position data.

Air Traffic Control Beacon Interrogator - Model 6

The Air Traffic Control Beacon Interrogator Model 6 (ATCBI-6) is a ground-based system that interrogates transponders, receives and processes replies from transponders, determines the range and azimuth to the aircraft, and forwards the information to appropriate air traffic control (ATC) automation systems. Replies provide identification and altitude data of the transponder.

Automatic Dependent Surveillance - Broadcast Avionics

Automatic Dependent Surveillance-Broadcast Avionics (ADS-B Avionics) transmits and receives Global Positioning System (GPS)-derived aircraft 4-dimensional position data, aircraft identification, aircraft velocity, and other selected aircraft data. Augmented GPS data may be required for certain applications. This is intended to be a surveillance system and not an avoidance system. The broadcast of own position is automatic and is intended to provide surveillance information to other users. The aircraft or vehicle originating the broadcast may not have knowledge of which users are receiving its broadcast. The ADS-B avionics are designed to transmit this 4-dimensional position data of own aircraft or vehicle and to also receive same type of information from others that are similarly equipped to receive and process ADS-B surveillance information.

Automatic Direction Finder

Automatic Direction Finder (ADF) - An aircraft radio navigation system which senses and indicates the direction to a L/MF nondirectional radio beacon (NDB) ground transmitter. Direction is indicated to the pilot as a magnetic bearing or as a relative bearing to the longitudinal axis of the aircraft depending on the type of indicator installed in the aircraft. In certain applications, such as military, ADF operations may be based on airborne and ground transmitters in the VHF/UHF frequency spectrum.

Backup Emergency Communications

Back Up Emergency Communications (BUEC) provides a secondary A/G communications path for the en route environment, giving each controller access to another completely diverse radio channel. The original system, previously employed at all 20 CONUS ARTCCs, uses a limited number of tunable transceivers that are shared by a greater number of controllers through a priority system at the ARTCC.

The old BUEC is being replaced with dedicated BUEC channels on a one per sector basis to solve a serious supportability problem with the 30+-year-old system and to provide each controller with improved back up radio coverage. The new BUEC outlets have been sited for best coverage for the sectors"" service volumes that because of size require multiple RCAGs for coverage will have multiple BUEC sites. The program has no prime contractor. All activities including site selection, engineering, site preparation, transition, and testing are performed by the ANI and regional personnel. The Product Team provides equipment and funding for implementation. The new BUEC system employs the same equipment as the RCAGs.

Backup Emergency Communications Replacement

The Backup Emergency Communications (BUEC) Replacement (BUEC Repl) mechanism replaces existing analog BUEC system with an updated analoq BUEC system. Also provides backup for Remote Communications Air-Ground Facility (RCAG) very high frequency (VHF) and ultra high frequency (UHF) communications channels (radio equipment) that are available to an Air Route Traffic Control Center (ARTCC) for immediate use if one or more primary RCAG frequencies fail. The system consists of remotely controlled equipment, and several VHF and UHF transceivers. A typical BUEC system may provide as many as 60 VHF and UHF transceivers for an ARTCC.

Cockpit Display of Traffic Information Avionics

The Cockpit Display of Traffic Information Avionics (CDTI Avionics) is a generic name for a display that provides the flight crew with surveillance information about other proximate aircraft, including their position. It enables pilots to electronically "see and avoid" other aircraft.

Digital Voice Recorder System Replacement

The Digital Voice Recorder System Replacement (DVRS Replacement) is a modern digital system used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

Display System Replacement

The Display System Replacement (DSR) provides continuous real-time, automated support to air traffic controllers for the display of surveillance, flight data and other critical control information. This information is processed by the Host and Oceanic Computer System Replacement (HOCSR) and the Enhanced Direct Access Radar Channel (EDARC) subsystems. The DSR provides controller workstations, displays, and input/output devices and a communications infrastructure to connect the DSR with external processing elements of the en route ATC automation system.

Distance Measuring Equipment

Distance Measuring Equipment (DME) is a UHF (Ultra High Frequency) ground-based radio navigation aid. DME avionics transmit interrogation pulses, and the ground-based responder sends a reply. The avionics process the reply and determine the slant range between the aircraft and the ground station. Separate funding segments and acquisition projects have been established for two generic classes of DME ground stations: High power (en route) DMEs, and low power (terminal) DMEs. This mechanism addresses the high power DMEs.

DMEs may be provided alone, but are more often collocated with a VOR to form a VOR/DME facility, allowing aircraft to determine both the bearing and slant range to the ground station - and hence a navigational position fix. DMEs are approved as a primary navigation system in the NAS. The DME function is frequently provided by the TACAN system that also provides azimuth guidance to military users. (DME and the distance-measuring portion of TACAN are functionally the same.) When combined with a VOR, these facilities are called VORTACs.

The DME network will be sustained to support en route navigation and to serve as an independent backup navigation source to GPS and GPS/WAAS. The DME network may also need to be expanded to provide a redundant area navigation (RNAV) capability for terminal area operations at major airports.

Distance Measuring Equipment Avionics

Distance Measuring Equipment Avionics (DME Avionics) receives, processes and displays for the pilot the distance data provided by ground-based DMEs.

En Route Communications Gateway

The En Route Communications Gateway (ECG) replaces PAMRI and provides a modernized LAN-based infrastructure capable of accommodating ERAM with minimal modifications. The PAMRI functions to be replaces include providing communications interfaces to external systems located in other ARTCCs, TRACONs, AFSSs, ATCSCC, NORAD, US Law Enforcement, US Customs, Military Base Operations, and international ACCs. Other interfaces include the FDIO Central Control Unit, which exchanges FDIO data with FAA and DOD facilities, and the NADIN Concentrator, which exchanges data through the NADIN PSN with the the M1FC via WMSCR. ECG increases the number of external interfaces to radars from 24 to 36. ECG provides internal interfaces between HCS and DARC (or EBUS) and between HCS and traffic flow processors such as ETMS and DSP. ECG includes a Monitor and Control subsystem and a display for monitoring up to two dozen radars--called the Random Access Plan Position Indicator (RAPPI).

The operational components of ECG consist of a front end processor (communications and surveillance interfaces), two gateway processors (internal connectivity to HCS and DARC/EBUS), and separate LANs that communicate between the front end and gateway processors on the primary channel and between the front end and gateway processors on the backup channel. The primary data path, consisting of the ECG primary gateway and the HCS, operate on separate hardware platforms. However, the backup data path, consisting of the ECG backup gateway and the EBUS, will operate on the same hardware platform--the ECG gateway platform. This processor, with both functions performed therein, is renamed to the Backup Interface Processor (BIP). In essence, a single processor operates on the backup channel, supporting both the ECG gateway function and the EBUS function. These two functions will remain, however, as two mechanisms in the NAS architecture.

En Route Information Display System

The En Route Information Display System (ERIDS) will provide real-time access to air traffic control information not currently available from the Host Computer System (HCS) and will make this auxillary information readily available to controllers. ERIDS will be installed at various positions, including the Traffic Management Units, Center Weather Service Units, and ARTCC Monitor and Control Centers. ERIDS will be integrated into the Display System consoles at each sector, will use the Centers airspace configuration for sector assignments, and will allow changes in sector assignments. ERIDS will display graphic and text data products, including air traffic control documents, Notices to Airmen (NOTAMS), weather data, traffic management data, and general information. ERIDS will exchange information with other facilities via interfaces to the Weather and Radar Processor, the Weather Information Network Server, U.S. NOTAM System, the Enhanced Traffic Management System, the National Airspace System Resources System, and the FAA Internet Protocol-Routed Multi-user Network (FIRMNet).

FAA Telecommunications Infrastructure

The FAA Telecommunications Infrastructure (FTI) services will replace most FAA-owned and leased telecommunications systems/services and consolidate their functions under a single service provider. The FTI contract will provide services that will meet current and future telecommunications requirements while reducing operational cost.

FTI is implemented in two phases. Phase 1 focuses on establishing an Internet Protocol (IP) backbone among 27 sites that includes ARTCCs, ATCSCC, Volpe, Aeronautical Center, WJHTC, and the two NADIN NNCC''s. Its primary goal is to transition 25 major nodes from the LINCS network. Phase 2 transitions circuits from DMN, BWM, NADIN PSN, and any remaining LINCS circuits.

FTI is a 15-year contract beginning in FY 2002 and ending in FY 2017.

Flexible Voice Switch

Voice communications is the primary means of communications among ATC facilities and between an Air Traffic Control Specialist (ATCS) and a pilot. Voice switching provides the ATCS both G/G Interfacility/Intrafacility and A/G voice communications connectivity. The NAS Voice Switch (NVS) program will replace aging voice switches and their analog interfaces with modern digital voice switches consisting of digital interfaces. The Flexible Voice Switch will be the common platform and baseline voice switch for all NAS domains with modularity and scalability to meet communications connectivity requirements. Additionally, this switch will be expandable to accommodate growth capacity requirements and able to support NAS Modernization needs as described in various Operational Improvements.

Flight Management System

Flight Management System (FMS) is a computer system that uses a large database to allow routes to be preprogrammed and stored. The system is constantly updated with respect to position accuracy by reference to one or more conventional radio navigation aids (i.e., multi-sensor systems). The system may also use information from an inertial reference unit (IRU) or from a stand-alone inertial navigation system (INS). A sophisticated program and its associated database ensure that the most appropriate navaids are automatically selected during the update cycle. FMSs combine the relative position information from two or more point-referenced navigation aids such as VOR or DME to determine the absolute position of the aircraft (latitude, longitude). The resulting Area Navigation (RNAV) capability permits operation on any desired course.

Flight Object Management System - En Route (key system)

The FOMS is a component of the Standard Automation Platform (SAP). The FOMS processes flight data received from multiple sources via the System Wide Information Management (SWIM) Management Unit. The FOMS also receives track data from the Surveillance Data Processor and associates tracks with flight data, producing the flight object, which is published to SWIM for subscriber use. Flight plan support functionality includes end-to-end profile evaluation in all phases of flight and evaluation against static and dynamic constraints (terrain, obstacles, airspace restrictions, etc.). The FOMS supports flight planning up to 180 days prior to day of flight. A user can access the flight object from initial to closeout in the same manner. The FOMS provides end-to-end flight data management from preflight to post analysis. Ownership of the flight object begins and ends with Traffic Flow Management and transitions during the flight to clearance delivery, ramp, surface, departure, transition to cruise, cruise, transition to arrival, and ramp. Flight data management is based on trajectory, assigned volumes, and "necessary" route structure.

General Weather Processor

The GWP collects, analyzes, tailors, displays, and distributes weather products. The GWP receives weather data from multiple sensors and distributes processed and tailored weather information via System Wide Information Management. The GWP provides a standard set of algorithms and access to data/products that convey current and future status of impacting weather to all National Airspace System services.

Global Positioning System

The Global Positioning System (GPS) is a worldwide, all-weather, satellite-based navigation system developed, maintained & operated by the U.S Department of Defense, and managed by an Interagency executive board. GPS is a (nominal) 24 satellite constellation orbiting at approximately 12,000 miles above the earth in six planes. Each satellite broadcasts a precisely timed L-band signal on the same frequency. User GPS receivers, oboard aircraft, in ground vehicles or hand-held, receive and process the signals from all satellites in view, with a minimum of four satellites necessary to determine the receiver''s three-dimensional position (i.e., latitude, longitude and altitude), velocity (if applicable) and the precise time of day. GPS equipped aircraft can navigate on published jetways or utilize Area Navigation (RNAV) to fly any desired course between two locations.

GPS avionics built to TSO C-129 support en route and terminal area navigation, as well as non-precision instrument approach operations. Approval has been granted for properly certified GPS avionics to be used as a primary means of navigation in oceanic airspace and in certain remote areas. In July 2003 the Wide Area Augmentation System (WAAS)was commissioned to augment the GPS signal to meet primary navigation service requirements for accuracy, coverage, availability, and integrity.

Global Positioning System Avionics

Global Positioning System (GPS) Avionics process the signals received from four or more GPS satellites and determine the three-dimensional position (i.e., latitude, longitude and altitude) and velocity of an aircraft, as well as the precise time of day. GPS avionics provide an Area Navigation (RNAV) capability that permits operation on any desired course.

GPS avionics built to TSO-C129 do not have augmentation (WAAS, LAAS) and are approved only as a supplemental navigation system in the NAS, meaning that they must be used in conjunction with a primary navigation system. TSO-C129 avionics support en route and terminal area navigation, as well as non-precision instrument approach operations. Approval has been granted for properly certified GPS avionics to be used as a primary means of navigation in oceanic airspace and in certain remote areas. In certain regions of the world (including the NAS), GPS will be augmented (Wide Area and Local Area systems) to satisfy additional requirements for accuracy, coverage, availability, and integrity. Augmented GPS avionics (WAAS, LAAS) are expected to support precision instrument approach operations, and to gain approval as a primary navigation system throughout the NAS. It is anticipated that users will migrate from TSO-C129 avionics to augmented GPS avionics (WAAS, LAAS).

High Frequency Aeronautical Telecommunictions Network Data Link

The High Frequency Aeronautical Telecommunications Network Data Link (HF ATN DL) provides two-way digital data communications over HF radios using International Civil Aviation Organization (ICAO) - compliant ATN digital data link applications in the transoceanic domain.

The FAA has no plans to develop its own HF ATN Data Communications system.

High Frequency Airborne Radios

High Frequency (HF) Airborne Radios are analog (HF multi-channel radio transceivers operating in the 2 - 30 Mhz frequency band installed in airborne commercial, cargo, and military aircraft transiting the oceanic, en route, terminal, or flight service station airspace domains. These transceivers are typically used in transoceanic applications.

High Frequency Ground Radios

High Frequency (HF) Ground Radios are analog HF radio devices operating in the 2 - 30 Mhz frequency band, which may be single channel transmitters and receivers or multi-channel transceivers. These radio devices are installed at oceanic and en route facilities and used to support tactical air traffic control (ATC) voice communications between a ground controller and a pilot in an aircraft in the oceanic domain. Additionally, these devices are also installed at regional facilities and used to support voice command and control communications /coordination in emergency or during disaster recovery situations occurring in the NAS.

Inertial Navigation System Avionics

Inertial Navigation System Avionics (INS Avionics) is a self-contained system, comprised of gyroscopes, accelerometers, and a navigation computer, which provides navigation information in response to inertial effects on system components. An INS is typically aligned with accurate position information prior to departure, and thereafter calculates its position as it progresses to the destination. INS accuracy degrades with time, but can be aligned in flight using radio navigation system updates. Many inertial systems employ a sophisticated automatic update scheme using dual- Distance Measuring Equipment (DME), very high frequency (VHF) Omnidirectional Range VOR or other sensor inputs (e.g., Global Positioning System (GPS)).

INS may be approved as a primary navigation system or may be used in combination with other systems. By programming a series of waypoints, the system will navigate along a predetermined track. INS provides an Area Navigation (RNAV) capability that permits operation on any desired course.

Integrated Information Workstation - Build 1 (key system)

IIW Build 1 will include the infrastructure and system interfaces to acquire, analyze, store, update, display, and manage the following information in an integrated manner: (1) National Airspace System (NAS) aeronautical, (2) airport environmental, (3) airborne and surface surveillance, (4) flight information, (5) weather information, and (6) NAS status. Build 1 will also replace its predecessor system, FAA Data Display System, as well as interface with the following systems in support of its mission: Flight Object Management, System Wide Information Management, Next Generation- Traffic Flow Management, Maintenance Management System, Unified Decision Management System, and Aeronautical Information Management.

Interfacility Communications

The Interfacility Communications (Interfacility Comm) includes all ground-to-ground communications systems connecting FAA facilities.

Loran-C

Loran-C is a low frequency (LF), long-range, ground-based radionavigation aid operated by the U.S. Coast Guard. Loran-C avionics measure the time difference between signals received from three or more ground stations and determine the two-dimensional position (i.e., latitude and longitude) and velocity of the aircraft. Loran-C avionics provide an Area Navigation (RNAV) capability that permits operation on any desired course within the coverage area of the stations being used.

Loran-C is currently approved as a supplemental system in the National Airspace System (NAS), meaning that it must be used in conjunction with a primary system. Current Loran-C avionics support en route navigation but do not support instrument approach operations.

Operation of Loran-C beyond 2008 will be based upon a determination by the Department of Transportation and the Department of Homeland Security whether the system is needed as a backup to GPS for transportation and timing applications.

Loran-C Avionics

Loran-C Avionics receive, process, and display to the pilot the latitude and longitude of the aircraft""s current position, based on data received from ground-based equipment.

Loran-C is currently approved as a supplemental system in the NAS, meaning that it must be used in conjunction with a primary system. Current Loran-C avionics support en route and terminal area navigation but do not support instrument approach operations. System operation beyond 2008 depends upon analysis by FAA and USCG to ascertain ability to support aviation nonprecision approach operations and maritime harbor entrance & approach operations.

Low Power Distance Measuring Equipment

Distance Measuring Equipment (DME) is an Ultra High Frequency (UHF) ground-based radio-navigation aid. DME avionics reply to interrogations from the ground station, which is capable of processing replies from over 100 aircraft at one time. The DME determines the time between an interrogation and a reply to determine the slant range between them.

Acquisition projects have been established for two generic classes of DME ground stations: high power and low power. High power DMEs (HPDMEs)are rated at 1kw and are located to support enroute navigation. HPDMEs are typically co-located with VHF OmniRange systems, forming what is termed a VOR/DME facility. Low power DMEs (LPDMEs) are rated at 100w and are located to support terminal area navigation such as ILS approaches.

LPDMEs are installed with many ILS facilities. When specified in the ILS approach procedure, DME may be used in lieu of the outer marker, as a back-course final approach fix, or to establish other fixes on the localizer course. LPDMEs are also installed with some localizer-only (LOC) facilities. Additional LPDMEs are being installed to support ILS approaches as recommended by the Commercial Aviation Safety Team (CAST).

Mode Select

The Mode Select (Mode S) mechanism is a ground-based system capable of selective interrogation of Mode S transponders and general interrogation of Air Traffic Control Radar Beacon System (ATCRBS) transponders within range. The system also receives, processes, and forwards the transponder replies to appropriate air traffic control (ATC) automation systems. Data formats for both interrogation and reply include data exchange capability.

The system also provides a Traffic Information Services (TIS) function that makes local traffic data available to the flight deck via the Mode S data link. TIS, a Mode S data link service, provides automatic traffic advisories to properly equipped aircraft. Pilots are able to request and receive a display of nearby traffic. The relative range, bearing, and altitude (if known) and a "proximate" or "threat" classification of nearby aircraft will be displayed in the cockpit.

Mode Select En Route (Service Life Extension Program)

The Mode Select En Route (Service Life Extension Program) Mode S En Route(SLEP)) is a replacement of items that have become uneconomical to maintain or difficult to obtain. The ASTERIX upgrade has not been implemented, but will be implemented at a later date.

Multi-Mode Digital Radios

Multi-Mode Digital Radios (MDRs) are ground-based Very High Frequency (VHF) air-traffic-control radios that can operate in several configurations: 1) analog voice with 25kHz channel spacing; 2) analog voice with 8.33 kHz channel spacing; and 3) VHF Data Link (VDL) Mode-3 which consists of two-way digital voice and data communication.

Power Systems

The Power Systems (Pwr Sys) mechanism provides for the conditioning of commercial power, including uninterruptible power systems (UPS), to eliminate voltage dropouts, surges, and voltage sags caused by sources outside the facility. Power distribution, grounding, bonding and shielding of electrical system within the facility is also part of the Pwr Sys.

The Power Systems (Pwr Sys) mechanism provides the following: 1.) ACEPS Busway Replacements, 2.) ACEPS EG Maintenance, 3.) ACEPS Monitoring & Diagnostics, 4.) ACEPS Fuel System Upgrade, 5.) ACEPS Training, 6.) Battery Monitoring, 7.) Training Facility, 8.) CPDS, 9.) Battery Replacements, 10.) DC Systems, 11.) EG, 12.) LPGBS, 13.) Power Cable, 14.) UPS, 15.) Contract Support.

Radio Control Equipment

Radio Control Equipment (RCE), located at both ATC facilities and remote communication sites, control the operation of remotely located ground to air Very High Frequency/Ultra High Frequency (VHF/UHF) radios used by air traffic controllers to communicate with pilots. RCE interfaces with the voice switch at the ATC facility, telephone landlines, and ground to air radios at the En Route Remote Communications Air/Ground (RCAG) sites, Terminal Remote Transmitter/Receiver (RTR) sites, and Flight Service Station Remote Communications Outlet (RCO) sites.

Standard Automation Platform Workstation Phase 1

The SAP consists of the Flight Object Management System (FOMS), the Surveillance Data Processor (SDP), and the SAP Workstation. The SAP will be installed in En Route and Arrival/Departure facilities. The SDP performs surveillance data processing and tracking on Surveillance Data Objects received from the Surveillance Data Network. The FOMS performs flight plan processing, associates flight and track data, and publishes the Flight Object on the System Wide Information Management network. The SAP workstation provides the controller interface for the FOMS and SDP.

Surveillance Data Network

National Airspace System (NAS) surveillance systems, including radar and automatic dependent surveillance systems will provide surveillance data objects via the Surveillance Data Network (SDN), which is a sub-network of the System Wide Information Management (SWIM) and the FAA Telecommunication Infrastructure (FTI). The published Surveillance Data Objects (SDO) will be made available to NAS and other users, including the Transportation Security Administration, Department of Defense, and others. Surveillance data availability supports 3-mile separation standards, gate-to-gate traffic management, seamless airspace, and dynamic resectorization. Improved surveillance information is provided in a timely and consistent manner seamlessly across the NAS for operations, planning, and decision making. The information will be available to all users and service providers via SDO in near real time. This information enables decisions to be based on a shared common view of situations, even as conditions are changing. Improved surveillance with SDOs will provide the automation higher quality of data for seamless surveillance and, in combination with other capabilities and new procedures, enable capacity and safety improvements. These benefits accrue from increased situation awareness by decision makers and improved operation of decision support and analysis tools that use surveillance information.

Surveillance Data Processor (key system)

SDP is a component of SAP and operates in En Route and Terminal. The SDP will make improvements to sensors and automation systems that will allow for expanded use of 3-mile separation and terminal procedures. The operational improvements enable more efficient control of aircraft and use of airspace. To accomplish this, all 1030/1090 Beacon interrogators will be upgraded to disseminate their existing 1.2 milli-radian azimuth accuracy and other information, such as time of measurement, confidence, quality, and so on. The automation system algorithms will be improved or new algorithms will be developed to exploit the additional information content of the improved surveillance reports. The method of presentation (display) to support 3-mile separation will be developed and tested to ensure safety. The existing long-range sensor surveillance update period is (12 seconds) and is insufficient to support 3-mile separation. In areas where only long-range sensors exist and where the Air Traffic Service requires 3-mile separation, these sensors may be modified to double the update rate to achieve 3-mile separation.

Sustain Air Route Traffic Control Center Facilities

The Sustain Air Route Traffic Control Center Facilities (Sustain ARTCC Facilities) mechanism replaces obsolete equipment and rehabilitates space in Air Route Traffic Control Center (ARTCC) facilities.

System Wide Information Management Build 1B

Build 1B provides all items in 1A, including more NAS information. This build integrates Flight and Surveillance Information systems into the SWIM architecture.

Tactical Air Navigation System

Tactical Air Navigation (TACAN) is a UHF (ultra high frequency) ground-based radio navigation aid that is the military counterpart of VHF Omnidirectional Range co-located with Distance Measuring Equipment (VOR/DME). TACAN avionics provide both the bearing and slant range to the ground station - and hence a navigation position fix. TACAN is often collocated with civil VOR systems to form a VORTAC to support military aircraft operations. TACAN is approved as a primary navigation system in the National Airspace System (NAS).

Ultra High Frequency Airborne Radios

The Ultra High Frequency Avionics (UHF Avionics) are analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225-400 MHz frequency band, which are multi-channel transceivers, installed in an airborne military platform. These airborne devices support the tactical two-way voice communications/ coordination between the military pilot in the military aircraft and the controller on the ground.

Ultra High Frequency Ground Radios

Ultra High Frequency (UHF) Ground Radios are analog UHF amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 Mhz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and flight service station domains.

Ultra High Frequency Ground Radios - Replacement

The Ultra High Frequency Ground Radios - Replacement (UHF Ground Radios - Repl) mechanism represents analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 MHz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and Flight Service Station domains.

Very High Frequency Airborne Radios

Very High Frequency (VHF) Airborne Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 Mhz frequency band which are multi-channel transceivers installed in an airborne platform (e.g., commercial, cargo, and general aviation aircraft). These airborne devices support the tactical two-way voice communications/coordination between the pilot in the aircraft and the controller on the ground.

Very High Frequency Data Link - 2 Avionics

Very High Frequency Data Link - 2 Avionics (VDL-2 Avionics) consist of airborne radios operating in the very high frequency (VHF) range that receive and transmit data using a low-speed, bit-oriented protocol and Carrier Sense Multiple Access (CSMA).

Very High Frequency Ground Radios

Very High Frequency (VHF) Ground Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 MHz frequency band which are single-channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the pilot in commercial, cargo, or general aviation aircraft in the oceanic, en route (i.e., ARTCC), terminal (i.e., TRACON/tower), and flight service station domains. Additionally, there are analog VHF frequency modulation (VHF - FM) radio devices operating in the 161 - 174 MHz frequency band that are multi-channel transceivers. These transceivers are used by flight inspection, aviation security, and airway facility specialists supporting local airport operations and maintenance or to perform their operational maintenance mission in support of the NAS. However, these same VHF-FM transceivers are also used to support the resolution of emergency situations or establish a level of voice command and control communications/coordination during disaster recovery.

Very High Frequency Multi-Mode Airborne Radios

Very High Frequency Multi-Mode Airborne Radios (VHF MM Airborne Radios) refers to an airborne radio operating in the very high frequency (VHF) range capable of operating in the following modes: (1)) analog voice (i.e., 25 kHz spacing for use in the United States and other similarly equipped countries); (2) VHF Digital Link Mode 2 (VDL Mode-2) (two-way digital data transmission); (3) VHF Digital Link Mode 3 (VDL Mode-3), (integrated two-way digital voice/data transmission); and (4) analog voice (i.e., 8.33 kHz spacing for use in Europe and other similarly equipped countries).

Very High Frequency Omnidirectional Range

The Very High Frequency Omnidirectional Range (VOR) is a ground-based radio navigation aid that broadcasts azimuth information to aircraft. VORs broadcast on assigned channels and include the facility identification in Morse code for pilot monitoring and verification. Some VORs are capable of broadcasting weather information and supporting pilot-controller communcations although these capabilities are typically provided by other infrastructure systems. In addition to providing en route and terminal area azimuth guidance, VORs also support nonprecision instrument approach operations.

Currently, VORs are the primary radio navigation aid in the National Airspace System (NAS). They serve as the internationally designated standard short-distance radio navigation aid for air carrier and general aviation Instrument Flight

Rules (IFR) operations.

VORs may be installed stand-alone or co-located with either a DME or TACAN system. When co-located the facility is typically referred to as a VOR/DME or VORTAC facility, respectively. This configuration allows pilots to determine their aircraft''s bearing and distance to a single location, i.e., fix.

With the advent of space-based navigation capabilities, a planned reduction in operational VORs will begin in approximately 2010. The reduction will result in a "backbone" minimum operational network (MON) that will support IFR operations at the busiest airports in the NAS while serving as a backup for space-based navigation.

Very High Frequency Omnidirectional Range Avionics

Very High Frequency Omnidirectional Range Avionics (VOR Avionics) receive, process, and display for the pilot the azimuth (bearing) to or from ground-based VOR transmitters.

Increasing numbers of aircraft are being equipped with GPS or WAAS avionics. However, since a reduced network of VOR stations is planned to continue in operation indefinitely as a backup to GPS, VOR avionics are expected to remain in service indefinitely in some aircraft.

Voice Switching and Control System Modification (Control System Upgrade)

The VSCS control system upgrade (VCSU) is a replacement of the Tandem computers that perform the logical switching and control for the VSCS system. The replacement of Tandem computers is for all ARTCCs including three spares.

Voice Switching and Control System Modification (Technological Refresh)

The Tech Refresh for VSCS is a service life extension. The Tech Refresh encompasses workstation upgrade, video display monitor, control equipment power, VSCU supportability, control shelf power supply, and software development demonstration system expansion.

Voice Switching and Control System Training and Backup Switches

Voice Switching and Control System Training and Backup Switch (VTABS) was developed to meet AT requirements for a separate standalone VSCS Backup and Training System. VTABS can be configured as a 50-position switch with the capability to support air traffic operations in the event of VSCS failure, hardware and software maintenance or power loss.

WAAS Corrections Broadcast Service

WAAS Corrections Broadcast Service is comprised of both Space-based and Ground Earth Station components.

Geostationary Earth Orbit (GEO) satellites receive Wide Area Augmentation System (WAAS) correction and integrity information transmitted by Ground Earth Stations (in WAAS terms referred to as Ground Uplink Stations (GUSs)) with information re-broadcast for WAAS avionics reception and use. Current broadcast service leased from INMARSAT".

Wide Area Augmentation System

The Wide Area Augmentation System (WAAS) consists of a distributed array of Reference and Master Stations designed to provide range correction and integrity information messages that are used by WAAS-capable Global Positioning System (GPS)avionics to accurately determine an aircraft''s 3-dimensional position in space. Accurately surveyed WAAS Reference Stations (WRS) receive and process GPS satellite range data which is forwarded to redundant WAAS Master Stations (WMS) for additional processing before sending the resulting range-correction data to redundant WAAS Ground Uplink Stations (GUS). The GUS transmit the data to Geostationary (GEO) satellites which retransmit them on a GPS civil-use frequency for reception by GPS/WAAS avionics. The WAAS data enables aircraft to determine their position in the airspace with an accuracy that will enable, for WAAS-equipped aircraft, introduction of advanced navigation initiatives such as precision and non-precision approaches to airports throughout the NAS, and reduced longitudinal separation.

The WAAS service volume includes the contiguous United States, Hawaii, portions of Alaska and the Caribbean, and the US border areas with Canada and Mexico. Planned enhancement of WAAS with additional WRS and GEO satellites will improve the coverage and availability of WAAS. Enhancement of the GPS by the Department of Defense (DoD) will provide a second civil frequency for WAAS that will provide additional improvements in navigation performance throughout the NAS. This latter version of the WAAS will be termed the GPS Landing System (GLS).

Wide Area Augmentation System Technology Refresh

Elements of WAAS technical refresh consist of two paths. One is improvement to operational capability that enhances performance of WAAS. The other is the known replacement of equipment, including hardware, software, and telecommunications links and networks within the WAAS WMS and GUS.

Technical refresh is subject to "re-baselining" activity that is currently underway and the FAA will make a corporate decision in September 2004.

Support Activities

AF Procedure Development for Conflict Probe with Multi-Objective Data Linked Resolutions

Airway Facilities procedures document the way airway facility operations are to be executed. The introduction of new systems, or changes to existing systems results in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

AF Training for Conflict Probe with Multi-Objective Data Linked Resolutions

Airway Facilities (AF) training is provided to AF workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AF Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

AT Procedure Development for Conflict Probe with Multi-Objective Data Linked Resolutions

Air Traffic Procedures document air traffic services and how they are implemented. The introduction of new systems, or changes to existing systems, may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

AT Training for Conflict Probe with Multi-Objective Data Linked Resolutions

Air Traffic (AT) training is provided to the AT workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AT Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

FAA Adaptation for for Conflict Probe with Multi-Objective Data Linked Resolutions

Many NAS systems incorporate parameters that are adjustable. This allows for the setting of system parameters to optimize performance at each particular site. When new systems that have adjustable parameters are introduced into the NAS, adaptation data must be developed for the system. Environmental and procedural changes may also result in the need to modify FAA Adaptation Data. Generally, adaptation will begin 12 months before IOC and continue until 12 months after IOC.

People

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Planning Controller

A Planning Controller performs the following activities: Ensure separation; Initiate control instructions; Operate interphones; Conduct air/ground communications via data link; Coordinate tactical traffic flows; Scan flight data; Correlate with situation data; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the tactical controller when aware of those instructions.

Radar Associate Controller

A Radar Associate Controller performs the following activities: Ensure separation, initiate control instructions; operate interphones; Accept and initiate non-automated handoffs; and ensure radar controller is made aware of the actions; Assist the radar controller by accepting or initiating automated handoffs/pointouts which are necessary for the continued smooth operation of the sector, and ensure that the radar controller is made immediately aware of any action taken; Coordinate, including pointouts; Monitor radios when not performing higher priority duties; Scan flight progress strips; Correlate with radar data; Manage flight progress strips; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the radar controller when aware of those instructions.

Radar Controller

A Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate automated handoffs; Assist the radar associate controller with non-automated handoff actions when needed; Assist the radar associate controller in coordination when needed; Scan radar display; Correlate with flight progress strip information; Ensure computer entries are completed on instructions or clearances you issue or receive; Ensure strip marking is completed on instructions or clearances you issue or receive.

Tactical Controller

A Tactical Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios and data link; Oversee data link communications by the associate tactical controller; Accept and initiate automated handoffs; Assist the planning controller with non-automated handoff actions when needed; Assist the planning controller in coordination when needed; Scan the situation display; Correlate with flight data; Ensure computer entries are completed on instructions or clearances you issue or receive.

Traffic Management Specialist

Traffic Management Specialists perform the following activities: Balance air traffic demand with the airspace's capacity to maintain maximum and efficient utilization of the NAS; Coordinate and implement traffic management directives if needed for area of responsibility; Monitor and balance traffic flows within the area of responsibility in accordance with traffic management directives; Evaluate effectiveness of traffic management directives and make necessary adjustments; Document delay information.

Interfaces

Flight Object Management System - En Route ← (Data Communication) → Integrated Information Workstation - Build 1

FOMS sends traffic management decision support tool information to IIW. The IIW serves as the controller interface to the tools.

Surveillance Data Processor — (Track Data) → Flight Object Management System - En Route

"SDP sends correlated surveillance data to FOMS for further processing, including association with flight data.

Issues

none identified

Service Group Air Traffic Services

Service TM-Synchronization

Capability Airborne

Operational Improvement

Provide National Traffic Management of Support Flow in the Enroute for Arrivals and Departures (104117)

Controllers and traffic managers, using arrival scheduling tools to synchronize traffic controlled by en route centers, improve traffic flow to airports. This includes improving delivery of aircraft to arrival fixes for better sequencing onto runways. With addition of widespread, real-time distribution of NAS data, the Multicenter Traffic Management Advisor is no longer needed.
17-Dec-1903 to 17-Dec-2099

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

En Route controllers and traffic managers, using arrival scheduling tools to synchronize traffic controlled by a single center, improve traffic flow to airports. This includes improving delivery of aircraft to arrival fixes for better sequencing onto runways. The initial implementation of Traffic Management Advisor (TMA) - Single Center, also referred to as single center metering, provides improved traffic flow to airports by providing en route controllers and traffic managers with arrival scheduling tools to synchronize traffic that is controlled by a single Air Route Traffic Control Center (ARTCC). This planning and controller decision support tool improves efficiency of sequencing aircraft and provides synchronization capability at airports served predominately or solely by arrival gateways and fixes. The tool will also be used in conjunction with a version of the Final

Approach Spacing Tools (FAST) in the Terminal Radar Approach Control (TRACON) facilities. Implementation of a single ARTCC follows the initial limited deployment as part of Free Flight Phase 1.

The TMA implementation for a single ARTCC was based on the Center-TRACON Automation System (CTAS) prototypes now is in operation at seven ARTCCs. Algorithms, displays, and interfaces developed for the TMA function in CTAS will be integrated with En Roure Automation Modernization (ERAM) and the Integrated Information Workstation (IIW) to provide automation support to air traffic controllers for metering traffic into arrival gateways and fixes. TMA provides the following capabilities to the ARTCC and TRACON Traffic Management Coordinators (TMC): develops an arrival scheduling plan (meter list) for adapted airports; meets flow constraints as entered by the TMC; provides meter fix load-balancing by assigning computed estimated time of arrival (ETA); and then assigns scheduled times of arrival (STA) to outer meter arcs, meter fixes, final approach fixes, and runway thresholds for each aircraft.

The TMA assists the ARTCC TMCs and air traffic controllers in several ways. In the transitional environment of the ARTCC to TRACON, the TMA increases situational awareness through its graphical displays and alerts. The TMA also generates statistics and reports about the traffic flow. In addition, TMA computes the undelayed ETA to the outer meter arc, meter fix, final approach fix, and runway threshold for each aircraft. Furthermore, TMA computes the sequences and STA to the outer meter arc, meter fix, final approach fix, and runway threshold for each aircraft to meet the sequencing and scheduling constraints as imposed by the TMC. TMA also assigns each aircraft to a runway to optimize the STA. TMA continually updates its results at a speed comparable to the live radar update rate in response to changing events and controller inputs.

System Wide Information Management (SWIM) will provide for National Airspace System-wide transport and sharing of information between all FAA air traffic facilities. This will allow the TMA to perform all cross-center functions effectively and eliminate the need for multi center TMA.

Benefits

There will be a reduction in static airspace restrictions, which means that hourly flow by ARTCC and Sector will be increased, and airport peak operations rate will increase.

Systems

Automatic Direction Finder

Automatic Direction Finder (ADF) - An aircraft radio navigation system which senses and indicates the direction to a L/MF nondirectional radio beacon (NDB) ground transmitter. Direction is indicated to the pilot as a magnetic bearing or as a relative bearing to the longitudinal axis of the aircraft depending on the type of indicator installed in the aircraft. In certain applications, such as military, ADF operations may be based on airborne and ground transmitters in the VHF/UHF frequency spectrum.

Conference Control System

The Conference Control System (CCS) is a replacement system for the legacy Operational Telephone System (OTS). The CCS is a telecommunications conferencing system that provides voice connectivity, switching, and teleconferencing capabilities for the Traffic Management Specialists and the NAS Operations Manager, at the FAA Air Traffic Control System Command Center (ATCSCC) in Herndon, VA. CCS enables communication from ATCSCC to Traffic Management Units (TMUs) at ARTCC and TRACONS, the Severe Weather Group at ARTCCs, FAA Regional Offices, FAA Headquarters, Airline Operations Centers (AOCs), and the general aviation community.

Digital Voice Recorder System Replacement

The Digital Voice Recorder System Replacement (DVRS Replacement) is a modern digital system used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

Display System Replacement

The Display System Replacement (DSR) provides continuous real-time, automated support to air traffic controllers for the display of surveillance, flight data and other critical control information. This information is processed by the Host and Oceanic Computer System Replacement (HOCSR) and the Enhanced Direct Access Radar Channel (EDARC) subsystems. The DSR provides controller workstations, displays, and input/output devices and a communications infrastructure to connect the DSR with external processing elements of the en route ATC automation system.

Display System Replacement - R-position Technical Refresh

Display System Replacement R-position Technical Refresh (DSR R-posit Tech Refresh) replaces the processor and LAN infrastructure for the R-position in preparation for ERAM. The replacement display will provide full and equivalent functionality (flight and surveillance data) on both the primary and backup ERAM channels. The R-position display processor will have direct data exchange capability with each of the ERAM LAN attached processors, including the Surveillance Data Processor (SDP), Flight Data Processor (FDP), Conflict Probe Processor (CPP), Traffic Management Advisor (TMA), and Controller-Pilot Data Link Communications (CPDLC).

Display System Replacement Console Reconfiguration Monitor Replacement

Display System Replacement Console Reconfiguration Monitor Replacement (DSR CRMR) replaces the R-position cathode ray tube (CRT) with a 20 x 20-inch square flat panel liquid crystal displays (LCD). Replacement of the large CTR with a LCD will free up space in the rear of the DSR console for relocating Voice Switch Control System (VSCS) equipment. Relocating the VSCS Electronic Module (VEM) and the VSCS Training and Backup System (VTABS)--formerly known as VEM/PEM)--is part of this activity and will improve equipment efficiency, packaging and the productivity of maintenance personnel.

Distance Measuring Equipment

Distance Measuring Equipment (DME) is a UHF (Ultra High Frequency) ground-based radio navigation aid. DME avionics transmit interrogation pulses, and the ground-based responder sends a reply. The avionics process the reply and determine the slant range between the aircraft and the ground station. Separate funding segments and acquisition projects have been established for two generic classes of DME ground stations: High power (en route) DMEs, and low power (terminal) DMEs. This mechanism addresses the high power DMEs.

DMEs may be provided alone, but are more often collocated with a VOR to form a VOR/DME facility, allowing aircraft to determine both the bearing and slant range to the ground station - and hence a navigational position fix. DMEs are approved as a primary navigation system in the NAS. The DME function is frequently provided by the TACAN system that also provides azimuth guidance to military users. (DME and the distance-measuring portion of TACAN are functionally the same.) When combined with a VOR, these facilities are called VORTACs.

The DME network will be sustained to support en route navigation and to serve as an independent backup navigation source to GPS and GPS/WAAS. The DME network may also need to be expanded to provide a redundant area navigation (RNAV) capability for terminal area operations at major airports.

Distance Measuring Equipment Avionics

Distance Measuring Equipment Avionics (DME Avionics) receives, processes and displays for the pilot the distance data provided by ground-based DMEs.

En Route Automation Modernization

The En Route Automation Modernization System (ERAM System) will replace the existing diverse but functionally unequal primary and backup channels (Host and DARC) with redundant, functionally equivalent primary and backup channels. The new primary and backup channels achieve identical full functionality by using highly reliable fault tolerant processing elements running identical software. A tertiary system with diverse software, and physical and electronic isolation from the ERAM primary and back-up systems, will be maintained as fall back until the functionality, reliability, and availability of ERAM is demonstrated in the field. A training subsystem with functionality identical to the operational system will permit training to be conducted in parallel with operations.

In the past decade, several functions (URET, CTAS, etc.) were implemented as outboard processors/processes to the Host. As ERAM evolves in successive builds, this functionality will be integrated into ERAM as described below.

ERAM''s enhanced FDP will accommodate flexible routing around congestion, weather, and restrictions and improve efficiency by providing improved traffic flows. The enhanced ERAM surveillance processing will accomodate a larger geographic coverage, increased quantity of radar inputs and, when available, integration of Automatic Dependent Surveillance Broadcast data. In addition ERAM will use the improved accuracy and information disseminated by the sensors using the All-purpose Structured EUROCONTROL Radar Information Exchange (ASTERIX) format.

ERAM will allow for improved performance of decision support tools such as the Enhanced Traffic Management System (ETMS). ERAM will also incorporate Center-terminal radar approach control automation system (CTAS) functions (descent advisor, timelines, load graphs, automated miles-in-trail, and the situation display) and multi-center metering using miles-in-trail or time-based scheduling and meter lists.

ERAM will employ an industry standard LAN-based system to improve the efficiency of integrating commercial-off-the-shelf solutions in the future. ERAM software will be developed using a common high-level language to increase the FAA''s access to market-based skills and lower the cost of development and lifecycle maintenance. ERAM''s design will enable future enhancements and maintenance of components without affecting operational availability and increased productivity from an integrated monitor and control capability.

Flexible Voice Switch

Voice communications is the primary means of communications among ATC facilities and between an Air Traffic Control Specialist (ATCS) and a pilot. Voice switching provides the ATCS both G/G Interfacility/Intrafacility and A/G voice communications connectivity. The NAS Voice Switch (NVS) program will replace aging voice switches and their analog interfaces with modern digital voice switches consisting of digital interfaces. The Flexible Voice Switch will be the common platform and baseline voice switch for all NAS domains with modularity and scalability to meet communications connectivity requirements. Additionally, this switch will be expandable to accommodate growth capacity requirements and able to support NAS Modernization needs as described in various Operational Improvements.

General Weather Processor

The GWP collects, analyzes, tailors, displays, and distributes weather products. The GWP receives weather data from multiple sensors and distributes processed and tailored weather information via System Wide Information Management. The GWP provides a standard set of algorithms and access to data/products that convey current and future status of impacting weather to all National Airspace System services.

High Frequency Airborne Radios

High Frequency (HF) Airborne Radios are analog (HF multi-channel radio transceivers operating in the 2 - 30 Mhz frequency band installed in airborne commercial, cargo, and military aircraft transiting the oceanic, en route, terminal, or flight service station airspace domains. These transceivers are typically used in transoceanic applications.

Multi-Mode Digital Radios

Multi-Mode Digital Radios (MDRs) are ground-based Very High Frequency (VHF) air-traffic-control radios that can operate in several configurations: 1) analog voice with 25kHz channel spacing; 2) analog voice with 8.33 kHz channel spacing; and 3) VHF Data Link (VDL) Mode-3 which consists of two-way digital voice and data communication.

Power Systems

The Power Systems (Pwr Sys) mechanism provides for the conditioning of commercial power, including uninterruptible power systems (UPS), to eliminate voltage dropouts, surges, and voltage sags caused by sources outside the facility. Power distribution, grounding, bonding and shielding of electrical system within the facility is also part of the Pwr Sys.

The Power Systems (Pwr Sys) mechanism provides the following: 1.) ACEPS Busway Replacements, 2.) ACEPS EG Maintenance, 3.) ACEPS Monitoring & Diagnostics, 4.) ACEPS Fuel System Upgrade, 5.) ACEPS Training, 6.) Battery Monitoring, 7.) Training Facility, 8.) CPDS, 9.) Battery Replacements, 10.) DC Systems, 11.) EG, 12.) LPGBS, 13.) Power Cable, 14.) UPS, 15.) Contract Support.

Surveillance Data Network

National Airspace System (NAS) surveillance systems, including radar and automatic dependent surveillance systems will provide surveillance data objects via the Surveillance Data Network (SDN), which is a sub-network of the System Wide Information Management (SWIM) and the FAA Telecommunication Infrastructure (FTI). The published Surveillance Data Objects (SDO) will be made available to NAS and other users, including the Transportation Security Administration, Department of Defense, and others. Surveillance data availability supports 3-mile separation standards, gate-to-gate traffic management, seamless airspace, and dynamic resectorization. Improved surveillance information is provided in a timely and consistent manner seamlessly across the NAS for operations, planning, and decision making. The information will be available to all users and service providers via SDO in near real time. This information enables decisions to be based on a shared common view of situations, even as conditions are changing. Improved surveillance with SDOs will provide the automation higher quality of data for seamless surveillance and, in combination with other capabilities and new procedures, enable capacity and safety improvements. These benefits accrue from increased situation awareness by decision makers and improved operation of decision support and analysis tools that use surveillance information.

System Wide Information Management Build 1B

Build 1B provides all items in 1A, including more NAS information. This build integrates Flight and Surveillance Information systems into the SWIM architecture.

Traffic Flow Management System Applications Upgrade

Traffic Flow Management System Applications Upgrade (TFM Applications Upgrade) will be an integrated system used by traffic management specialists and coordinators to track and predict traffic flows; analyze effects of ground or weather delays; evaluate alternative routing strategies; improve collaborative decision making among users; plan traffic flow patterns; and assess daily and long term traffic flow performance in the National Airspace System (NAS) to better balance capacity and demand requirements for all users. Using the current Enhanced Traffic Flow Management System (ETMS) functionality as a baseline, this mechanism will evolve to a new open systems software architecture. This new architecture is expected to lower the life cycle cost of software maintenance, the development/integration of existing and future functionality and capabilities, and interface to other domain automation systems. This upgrade will facilitate new functionality and integrate existing TFM standalone subsystems and prototypes such as POET, TM Log, ESIS, DSP, etc. and improve the human computer interface (HCI).

Traffic Management Advisor Single Center Free Flight Phase 2

Traffic Management Advisor Single Center (Free Flight Phase 2) (TMA SC (FFP2)) is similar to TMA SC FFP1. It computes flight arrival sequencing, scheduled time of arrival (STA), and estimated time of arrival (ETA) at various points along the aircraft flight path to an airport. These points include an outer meter arc, the meter fix, the final approach fix, and runway threshold. In response to changing events and controller inputs, TMA-SC provides results to the en route sector team to maintain optimum flow rates to runways. It does this by providing continual updates of meter fix STA and delay information at a speed comparable to the live radar update rates. The team defines maneuvers and issues clearances so aircraft cross the meter fixes at the STA. Since TMA-SC calculates a schedule for arriving aircraft to meet Terminal Radar Approach Control Facility (TRACON) acceptance rates set by Traffic Management Specialists (TMSs), selected airports must be the basis for a TMA-SC deployment plan. TMA also maintains statistics on the traffic flow and the efficiency of the airport and displays them to TMSs.

TMA SC FFP2 adds 4 more ARTCCs and 4 more TRACONS to the 7 ARTCCs and 7 TRACONS deployed under TMA SC (FFP1), giving a total of 22 TMA SCs at 11 ARTCCs and 11 TRACONS.

Ultra High Frequency Airborne Radios

The Ultra High Frequency Avionics (UHF Avionics) are analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225-400 MHz frequency band, which are multi-channel transceivers, installed in an airborne military platform. These airborne devices support the tactical two-way voice communications/ coordination between the military pilot in the military aircraft and the controller on the ground.

Ultra High Frequency Ground Radios

Ultra High Frequency (UHF) Ground Radios are analog UHF amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 Mhz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and flight service station domains.

Very High Frequency Airborne Radios

Very High Frequency (VHF) Airborne Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 Mhz frequency band which are multi-channel transceivers installed in an airborne platform (e.g., commercial, cargo, and general aviation aircraft). These airborne devices support the tactical two-way voice communications/coordination between the pilot in the aircraft and the controller on the ground.

Very High Frequency Ground Radios

Very High Frequency (VHF) Ground Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 MHz frequency band which are single-channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the pilot in commercial, cargo, or general aviation aircraft in the oceanic, en route (i.e., ARTCC), terminal (i.e., TRACON/tower), and flight service station domains. Additionally, there are analog VHF frequency modulation (VHF - FM) radio devices operating in the 161 - 174 MHz frequency band that are multi-channel transceivers. These transceivers are used by flight inspection, aviation security, and airway facility specialists supporting local airport operations and maintenance or to perform their operational maintenance mission in support of the NAS. However, these same VHF-FM transceivers are also used to support the resolution of emergency situations or establish a level of voice command and control communications/coordination during disaster recovery.

Very High Frequency Multi-Mode Airborne Radios

Very High Frequency Multi-Mode Airborne Radios (VHF MM Airborne Radios) refers to an airborne radio operating in the very high frequency (VHF) range capable of operating in the following modes: (1)) analog voice (i.e., 25 kHz spacing for use in the United States and other similarly equipped countries); (2) VHF Digital Link Mode 2 (VDL Mode-2) (two-way digital data transmission); (3) VHF Digital Link Mode 3 (VDL Mode-3), (integrated two-way digital voice/data transmission); and (4) analog voice (i.e., 8.33 kHz spacing for use in Europe and other similarly equipped countries).

Very High Frequency Omnidirectional Range Avionics

Very High Frequency Omnidirectional Range Avionics (VOR Avionics) receive, process, and display for the pilot the azimuth (bearing) to or from ground-based VOR transmitters.

Increasing numbers of aircraft are being equipped with GPS or WAAS avionics. However, since a reduced network of VOR stations is planned to continue in operation indefinitely as a backup to GPS, VOR avionics are expected to remain in service indefinitely in some aircraft.

Voice Switching and Control System

The Voice Switching and Control System (VSCS) is installed in the Air Route Traffic Control Center (ARTCC). The VSCS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The VSCS provides the Air Traffic Control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ARTCC (intercom), interconnectivity between controllers in separate ARTCCs (interphone), and interconnectivity between ARTCC controllers and Terminal Radar Approach Control (TRACON) controllers/Airport Traffic Control Tower (ATCT) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ARTCC controllers and pilots is also supported by the VSCS.

Support Activities

AT Procedure Development for National Traffic Management of Support Flow in the Enroute for Arrivals and Departures

Air Traffic Procedures document air traffic services and how they are implemented. The introduction of new systems, or changes to existing systems, may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

AT Training for National Traffic Management of Support Flow in the Enroute for Arrivals and Departures

Air Traffic (AT) training is provided to the AT workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AT Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

People

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Planning Controller

A Planning Controller performs the following activities: Ensure separation; Initiate control instructions; Operate interphones; Conduct air/ground communications via data link; Coordinate tactical traffic flows; Scan flight data; Correlate with situation data; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the tactical controller when aware of those instructions.

Radar Associate Controller

A Radar Associate Controller performs the following activities: Ensure separation, initiate control instructions; operate interphones; Accept and initiate non-automated handoffs; and ensure radar controller is made aware of the actions; Assist the radar controller by accepting or initiating automated handoffs/pointouts which are necessary for the continued smooth operation of the sector, and ensure that the radar controller is made immediately aware of any action taken; Coordinate, including pointouts; Monitor radios when not performing higher priority duties; Scan flight progress strips; Correlate with radar data; Manage flight progress strips; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the radar controller when aware of those instructions.

Radar Controller

A Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate automated handoffs; Assist the radar associate controller with non-automated handoff actions when needed; Assist the radar associate controller in coordination when needed; Scan radar display; Correlate with flight progress strip information; Ensure computer entries are completed on instructions or clearances you issue or receive; Ensure strip marking is completed on instructions or clearances you issue or receive.

Tactical Controller

A Tactical Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios and data link; Oversee data link communications by the associate tactical controller; Accept and initiate automated handoffs; Assist the planning controller with non-automated handoff actions when needed; Assist the planning controller in coordination when needed; Scan the situation display; Correlate with flight data; Ensure computer entries are completed on instructions or clearances you issue or receive.

Traffic Management Specialist

Traffic Management Specialists perform the following activities: Balance air traffic demand with the airspace's capacity to maintain maximum and efficient utilization of the NAS; Coordinate and implement traffic management directives if needed for area of responsibility; Monitor and balance traffic flows within the area of responsibility in accordance with traffic management directives; Evaluate effectiveness of traffic management directives and make necessary adjustments; Document delay information.

Interfaces

no interfaces

Issues

none identified

Service Group Air Traffic Services

Service TM-Synchronization

Capability Airborne

Operational Improvement

Synchronize Traffic for Flexible Entry into Oceanic Tracks (104102)

Controllers equipped with decision support systems to improve in-trail climbs, descents, and passing maneuvers for properly equipped aircraft improve user access and efficient use of oceanic airspace.

10-Jan-2011 to 01-Jul-2018

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

The concept of Oceanic Traffic Synchronization is to make it easier for aircraft to join an oceanic Organized Track Structure along the track, rather than at the track origin or in a published or Federal Aviation Administration (FAA)- specified trajectory. The pilot or Airline Operations Center (AOC) defines the intersecting trajectory, and the FAA accommodates depending on traffic and forecast weather conditions. The transition will be from radar airspace to procedural or non-radar airspace. In Oakland or New York, this will be from a transition sector to an oceanic sector. In Anchorage, where the oceanic sectors each contain some radar airspace, this operation may occur entirely within a single oceanic sector. Oceanic traffic synchronization will require more frequent position reports. This will require automatic dependent surveillance - addressable (ADS-A) and is limited initially to Future Air Navigation System 1/A-equipped aircraft.

The AOC uses a tool called Dynamic Aircraft Route Planning to replan flights. The AOC submits to the FAA a flight plan, including a request for Flexible Transition into the flex track Organized Track System mid-stream, rather than at the normal entry point. Included in the flight plan would be the proposed route (a series of latitude/longitude waypoints with time and altitude at each point) to the proposed entry point and the proposed time, altitude, and latitude/longitude location of the user-preferred entry point. The controller then does a conflict probe and, if conflict-free, the clearance is issued. The change is then auto-loaded into the aircraft flight management system to minimize possible error. The process of issuing the clearance will automatically set up a more intense Enhanced-Advanced Technologies and Oceanic Procedures (E-ATOP) monitoring of aircraft conformance while the aircraft is in procedural airspace. This is done by entering into an increased rate ADS-A periodic report contract and establishing ADS-A deviation event contract(s). The Enhanced-Advanced Technologies and Oceanic Procedures (E- ATOP) aircraft monitoring will revert to standard for all other traffic on the organized track structure when the aircraft joins the assigned oceanic track.

Benefits

The fly-as-filed percentage will increase, as will the user-requested reroute percentage being granted. These results in time and fuel savings.

Systems

Advanced Technologies and Oceanic Procedures Controller Work Station

The Advanced Technologies and Oceanic Procedures Controller Work Station (ATOP Controller WS). The ATOP Controller Workstation is part of a non-developmental item (NDI) automation, training, maintenance, installation, transition, and procedures development support acquisition. The workstation will interface with the integrated Flight Data Processing (FDP). The workstation will contain displays for information from primary and secondary radar, Automatic Dependent Surveillance (ADS), Controller Pilot Data Link Communications (CPDLC) position reports, and relayed pilot reports from High Frequency (HF) voice service provider. The ATOP workstation will support radar and non-radar procedural separation, tracking clearances issued via CPDLC or messages through the HF radio service provider, conflict detection/prediction capabilities through the use of controller tools, and coordination via Air Traffic Services Interfacility Data Communications System (AIDCS). Additionally, it is expected to support operations in which the information and primary capabilities required for the controller to maintain situational awareness and provide procedural separation services are available on the display (rather than paper flight strips).

Aeronautical Information Management

The AIM system represents the evolution of the acquisition, storage, processing and dissemination of aeronautical information in the NAS. Aeronautical information is defined as any information concerning the establishment, condition, or change in any component (facility, service, or procedure of, of hazard) of the National Airspace System. Aeronautical information comes in two types a somewhat static type, and a more dynamic type. The static portion represents the aeronautical information baseline as a particular date, while the dynamic portion updates particular aspects of the static portion due to system impacts or events. The Static portion represents data that NAS automation systems and other users use to adapt their software to properly operate. The dynamic portion represents information typically contained in NOTAMs that indicate short-term changes to the static data.

Many NAS systems support the acquisition, generation, and dissemination of the static aeronautical information. Information of this type includes airspace structures, airways, locations of NAS facilities, inter-facility letters of agreement and memorandums of understanding, obstructions, standard procedures, airspace charts, etc.

Several NAS systems also support the acquisition, generation, processing, and dissemination of the dynamic aeronautical information. Information of this type includes, facility outages, runway closures, temporary flight restrictions, airspace constraints, SIGMETs, etc. This information must be disseminated to users and providers of air traffic services in a timely and efficient manner.

AIM will provide the central point for the dissemination of high quality, configuration controlled information to NAS systems, service providers and users of the NAS. AIM will disseminate data based on the Aeronautical Information Exchange Model (AIXM) protocols.

Air Traffic Control Beacon Interrogator - Model 6

The Air Traffic Control Beacon Interrogator Model 6 (ATCBI-6) is a ground-based system that interrogates transponders, receives and processes replies from transponders, determines the range and azimuth to the aircraft, and forwards the information to appropriate air traffic control (ATC) automation systems. Replies provide identification and altitude data of the transponder.

Backup Emergency Communications

Back Up Emergency Communications (BUEC) provides a secondary A/G communications path for the en route environment, giving each controller access to another completely diverse radio channel. The original system, previously employed at all 20 CONUS ARTCCs, uses a limited number of tunable transceivers that are shared by a greater number of controllers through a priority system at the ARTCC.

The old BUEC is being replaced with dedicated BUEC channels on a one per sector basis to solve a serious supportability problem with the 30+-year-old system and to provide each controller with improved back up radio coverage. The new BUEC outlets have been sited for best coverage for the sectors"" service volumes that because of size require multiple RCAGs for coverage will have multiple BUEC sites. The program has no prime contractor. All activities including site selection, engineering, site preparation, transition, and testing are performed by the ANI and regional personnel. The Product Team provides equipment and funding for implementation. The new BUEC system employs the same equipment as the RCAGs.

Digital Voice Recorder System Replacement

The Digital Voice Recorder System Replacement (DVRS Replacement) is a modern digital system used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

Distance Measuring Equipment

Distance Measuring Equipment (DME) is a UHF (Ultra High Frequency) ground-based radio navigation aid. DME avionics transmit interrogation pulses, and the ground-based responder sends a reply. The avionics process the reply and determine the slant range between the aircraft and the ground station. Separate funding segments and acquisition projects have been established for two generic classes of DME ground stations: High power (en route) DMEs, and low power (terminal) DMEs. This mechanism addresses the high power DMEs.

DMEs may be provided alone, but are more often collocated with a VOR to form a VOR/DME facility, allowing aircraft to determine both the bearing and slant range to the ground station - and hence a navigational position fix. DMEs are approved as a primary navigation system in the NAS. The DME function is frequently provided by the TACAN system that also provides azimuth guidance to military users. (DME and the distance-measuring portion of TACAN are functionally the same.) When combined with a VOR, these facilities are called VORTACs.

The DME network will be sustained to support en route navigation and to serve as an independent backup navigation source to GPS and GPS/WAAS. The DME network may also need to be expanded to provide a redundant area navigation (RNAV) capability for terminal area operations at major airports.

Dynamic Ocean Tracking System Plus

The Dynamic Ocean Tracking System Plus (DOTS Plus) automation system is located in each of the three Oceanic ARTCCs (Anchorage, Oakland, and New York) and in the ATCSCC. DOTS permits airlines to save fuel by flying random routes, in contrast to structured routes, and permit the air traffic controller to achieve lateral spacing requirements more efficiently. DOTS generates flexible oceanic tracks that are optimized for best airspace utilization and best time/fuel efficiency. Flexible tracks are updated twice a day using forecast winds aloft and separation (vertical and lateral) requirements. The DOTS oceanic traffic display gives a visual presentation of tracks and weather. DOTS sends traffic advisories and track advisories to users and receives aircraft progress reports from the commercial communications service providers. These external data exchanges are achieved through interfaces with the National Airspace Data Interchange Network (NADIN) Packet Switch Network (PSN) for Position Reports, Air Traffic Management (ATM) messages, Pilot Reports (PIREPS), and the Anchorage FDP2000. An interface to the Enhanced Traffic Flow Management System (ETMS) will improve coordination between the oceanic and domestic Traffic Flow Management (TFM) systems/activities. The DOTS Weather Server, installed at the Air Traffic Control System Command Center (ATCSCC), receives National Weather Service (NWS) wind and temperature data via the WARP/WINS system. The weather data is then distributed to the ARTCCs via commercially provided Integrated Services Digital Network (ISDN) telephone lines. DOTS Plus supports separation reduction initiatives as stipulated in RNP-10 (Required Navigation Performance) for decreasing lateral separation from 100 nautical miles to 50 nautical miles.

En Route Automation Modernization

The En Route Automation Modernization System (ERAM System) will replace the existing diverse but functionally unequal primary and backup channels (Host and DARC) with redundant, functionally equivalent primary and backup channels. The new primary and backup channels achieve identical full functionality by using highly reliable fault tolerant processing elements running identical software. A tertiary system with diverse software, and physical and electronic isolation from the ERAM primary and back-up systems, will be maintained as fall back until the functionality, reliability, and availability of ERAM is demonstrated in the field. A training subsystem with functionality identical to the operational system will permit training to be conducted in parallel with operations.

In the past decade, several functions (URET, CTAS, etc.) were implemented as outboard processors/processes to the Host. As ERAM evolves in successive builds, this functionality will be integrated into ERAM as described below.

ERAM''s enhanced FDP will accommodate flexible routing around congestion, weather, and restrictions and improve efficiency by providing improved traffic flows. The enhanced ERAM surveillance processing will accomodate a larger geographic coverage, increased quantity of radar inputs and, when available, integration of Automatic Dependent Surveillance Broadcast data. In addition ERAM will use the improved accuracy and information disseminated by the sensors using the All-purpose Structured EUROCONTROL Radar Information Exchange (ASTERIX) format.

ERAM will allow for improved performance of decision support tools such as the Enhanced Traffic Management System (ETMS). ERAM will also incorporate Center-terminal radar approach control automation system (CTAS) functions (descent advisor, timelines, load graphs, automated miles-in-trail, and the situation display) and multi-center metering using miles-in-trail or time-based scheduling and meter lists.

ERAM will employ an industry standard LAN-based system to improve the efficiency of integrating commercial-off-the-shelf solutions in the future. ERAM software will be developed using a common high-level language to increase the FAA''s access to market-based skills and lower the cost of development and lifecycle maintenance. ERAM''s design will enable future enhancements and maintenance of components without affecting operational availability and increased productivity from an integrated monitor and control capability.

En Route Communications Gateway

The En Route Communications Gateway (ECG) replaces PAMRI and provides a modernized LAN-based infrastructure capable of accommodating ERAM with minimal modifications. The PAMRI functions to be replaces include providing communications interfaces to external systems located in other ARTCCs, TRACONs, AFSSs, ATCSCC, NORAD, US Law Enforcement, US Customs, Military Base Operations, and international ACCs. Other interfaces include the FDIO Central

Control Unit, which exchanges FDIO data with FAA and DOD facilities, and the NADIN Concentrator, which exchanges data through the NADIN PSN with the the M1FC via WMSCR. ECG increases the number of external interfaces to radars from 24 to 36. ECG provides internal interfaces between HCS and DARC (or EBUS) and between HCS and traffic flow processors such as ETMS and DSP. ECG includes a Monitor and Control subsystem and a display for monitoring up to two dozen radars--called the Random Access Plan Position Indicator (RAPPI).

The operational components of ECG consist of a front end processor (communications and surveillance interfaces), two gateway processors (internal connectivity to HCS and DARC/EBUS), and separate LANs that communicate between the front end and gateway processors on the primary channel and between the front end and gateway processors on the backup channel. The primary data path, consisting of the ECG primary gateway and the HCS, operate on separate hardware platforms. However, the backup data path, consisting of the ECG backup gateway and the EBUS, will operate on the same hardware platform--the ECG gateway platform. This processor, with both functions performed therein, is renamed to the Backup Interface Processor (BIP). In essence, a single processor operates on the backup channel, supporting both the ECG gateway function and the EBUS function. These two functions will remain, however, as two mechanisms in the NAS architecture.

Enhanced-Advanced Technologies and Oceanic Procedures (key system)

E-ATOP will provide and manage automation and information to control Oceanic air traffic. E-ATOP will facilitate seamless aircraft transitions and data transfers between domestic and oceanic airspace.

Flexible Voice Switch

Voice communications is the primary means of communications among ATC facilities and between an Air Traffic Control Specialist (ATCS) and a pilot. Voice switching provides the ATCS both G/G Interfacility/Intrafacility and A/G voice communications connectivity. The NAS Voice Switch (NVS) program will replace aging voice switches and their analog interfaces with modern digital voice switches consisting of digital interfaces. The Flexible Voice Switch will be the common platform and baseline voice switch for all NAS domains with modularity and scalability to meet communications connectivity requirements. Additionally, this switch will be expandable to accommodate growth capacity requirements and able to support NAS Modernization needs as described in various Operational Improvements.

Flight Data Input/Output

The Flight Data Input/Output (FDIO) system provides flight progress information for use by the Tower, Terminal Radar Approach Control (TRACON) and Air Route Traffic Control Center (ARTCC) controllers. The FDIO system allows Air Traffic Control (ATC) Specialists to input automated flight data, perform data manipulation, and print flight strips.

Flight Data Input/Output Modification (Technical Refresh)

The Flight Data Input/Output Modification (Technical Refresh) (FDIO Mod (Tech Refresh)) mechanism replaces components that are uneconomical to maintain in the system providing an interface between the air traffic controller (terminal or en route) and the center computer. FDIO provides flight plan data in printed form for Airport Traffic Control Tower (ATCT) and Terminal Radar Approach Control (TRACON) controllers.

Flight Data Processing 2000

The Flight Data Processing 2000 (FDP2000) system replaced the oceanic flight data processing capability provided by Offshore Computer System (OCS) at the Anchorage Air Route Traffic Control Center (ARTCC). FDP2000 provides new hardware and software with added capabilities. The added capabilities include winds aloft modeling for improved aircraft position extrapolation accuracy, and support of Air Traffic Services Inter-facility Data Communications Systems (AIDC) ground-to-ground data link with compatible Flight Information Regions (FIRs). The OCS software was re-hosted from the Hewlett-Packard (HP) 1000 platform to the HP 9000 platform. FDP2000 provides flight data to the Microprocessor-En Route Automated Radar Tracking System (Micro-EARTS) radar data processing system. FDP2000 also integrates the existing Controller Pilot Data Link Communications (CPDLC) functions for data link communications with Future Air Navigation System 1/A (FANS 1/A)-equipped aircraft.

Flight Management System

Flight Management System (FMS) is a computer system that uses a large database to allow routes to be preprogrammed and stored. The system is constantly updated with respect to position accuracy by reference to one or more conventional radio navigation aids (i.e., multi-sensor systems). The system may also use information from an inertial reference unit (IRU) or from a stand-alone inertial navigation system (INS). A sophisticated program and its associated database ensure that the most appropriate navaids are automatically selected during the update cycle. FMSs combine the relative position information from two or more point-referenced navigation aids such as VOR or DME to determine the absolute position of the aircraft (latitude, longitude). The resulting Area Navigation (RNAV) capability permits operation on any desired course.

Future Air Navigation System 1/A

The Future Air Navigation System (FANS) is based on the International Civil Aviation Organization□s (ICAO) concept of a phased approach to implementing a modern, satellite-based, global Communication, Navigation, Surveillance/ Air Traffic Management (CNS/ATM) system. The following aircraft avionics are required to support an initial FANS implementation. These functions are referred to as FANS-1; the French developed equivalent for the Airbus A-330/340 is called FANS-A: Automatic Dependent Surveillance (ADS), ATC Data link, Airline Operational Control Data Link, Global Positioning System (GPS.

The FANS operational environment extends beyond the aircraft to include satellite, ground-based receiver/transmit stations, and a controller/pilot datalink system.

FANS 1/A consists of three message applications: AFN (ATS Facility Notification for logon to ATC via data link), ADS (Automatic Dependent Surveillance), CPDLC (Controller Pilot Data Link Communications). FANS 1/A uses the existing ACARS air/ground network to carry data link messages to/from the aircraft.

FANS 1 (Boeing implementation) was first certified in June of 1995 for use in the South Pacific. Oakland, Fiji, Aukland, and Brisbane FIRs were the initial participants for CPDLC using Inmarsat satcom. The latter three FIRs also used ADS for surveillance.

"The OEP identifies the ATOP program for implementation of FANS 1/A in Oakland, Anchorage and NY FIRs beginning in

2003." There are approximately 1000 FANS 1/A equipped aircraft in service as of mid-2002. All long-range model commercial transport aircraft have FANS 1 or FANS A either as standard equipment or as an option. In oceanic and remote areas, where FANS 1/A is currently in use, the Inmarsat geosynchronous satellite constellation provides the air/ground data link. HF data link will undergo trials as a FANS 1/A air/ground data link in late 2002-2003.

General Weather Processor

The GWP collects, analyzes, tailors, displays, and distributes weather products. The GWP receives weather data from multiple sensors and distributes processed and tailored weather information via System Wide Information Management. The GWP provides a standard set of algorithms and access to data/products that convey current and future status of impacting weather to all National Airspace System services.

Global Positioning System

The Global Positioning System (GPS) is a worldwide, all-weather, satellite-based navigation system developed, maintained & operated by the U.S Department of Defense, and managed by an Interagency executive board. GPS is a (nominal) 24 satellite constellation orbiting at approximately 12,000 miles above the earth in six planes. Each satellite broadcasts a precisely timed L-band signal on the same frequency. User GPS receivers, oboard aircraft, in ground vehicles or hand-held, receive and process the signals from all satellites in view, with a minimum of four satellites necessary to determine the receiver''s three-dimensional position (i.e., latitude, longitude and altitude), velocity (if applicable) and the precise time of day. GPS equipped aircraft can navigate on published jetways or utilize Area Navigation (RNAV) to fly any desired course between two locations.

GPS avionics built to TSO C-129 support en route and terminal area navigation, as well as non-precision instrument approach operations. Approval has been granted for properly certified GPS avionics to be used as a primary means of navigation in oceanic airspace and in certain remote areas. In July 2003 the Wide Area Augmentation System (WAAS)was commissioned to augment the GPS signal to meet primary navigation service requirements for accuracy, coverage, availability, and integrity.

Global Positioning System Avionics

Global Positioning System (GPS) Avionics process the signals received from four or more GPS satellites and determine the three-dimensional position (i.e., latitude, longitude and altitude) and velocity of an aircraft, as well as the precise time of day. GPS avionics provide an Area Navigation (RNAV) capability that permits operation on any desired course.

GPS avionics built to TSO-C129 do not have augmentation (WAAS, LAAS) and are approved only as a supplemental navigation system in the NAS, meaning that they must be used in conjunction with a primary navigation system. TSO-C129 avionics support en route and terminal area navigation, as well as non-precision instrument approach operations. Approval has been granted for properly certified GPS avionics to be used as a primary means of navigation in oceanic airspace and in certain remote areas. In certain regions of the world (including the NAS), GPS will be augmented (Wide Area and Local Area systems) to satisfy additional requirements for accuracy, coverage, availability, and integrity. Augmented GPS avionics (WAAS, LAAS) are expected to support precision instrument approach operations, and to gain approval as a primary navigation system throughout the NAS. It is anticipated that users will migrate from TSO-C129 avionics to augmented GPS avionics (WAAS, LAAS).

High Frequency Aeronautical Telecommunictions Network Data Link

The High Frequency Aeronautical Telecommunications Network Data Link (HF ATN DL) provides two-way digital data communications over HF radios using International Civil Aviation Organization (ICAO) - compliant ATN digital data link applications in the transoceanic domain.

The FAA has no plans to develop its own HF ATN Data Communications system.

High Frequency Airborne Radios

High Frequency (HF) Airborne Radios are analog (HF multi-channel radio transceivers operating in the 2 - 30 Mhz frequency band installed in airborne commercial, cargo, and military aircraft transiting the oceanic, en route, terminal, or flight service station airspace domains. These transceivers are typically used in transoceanic applications.

High Frequency Ground Radios

High Frequency (HF) Ground Radios are analog HF radio devices operating in the 2 - 30 Mhz frequency band, which may be single channel transmitters and receivers or multi-channel transceivers. These radio devices are installed at oceanic and en route facilities and used to support tactical air traffic control (ATC) voice communications between a ground controller and a pilot in an aircraft in the oceanic domain. Additionally, these devices are also installed at regional facilities and used to support voice command and control communications /coordination in emergency or during disaster recovery situations occurring in the NAS.

Inertial Navigation System Avionics

Inertial Navigation System Avionics (INS Avionics) is a self-contained system, comprised of gyroscopes, accelerometers, and a navigation computer, which provides navigation information in response to inertial effects on system components. An INS is typically aligned with accurate position information prior to departure, and thereafter calculates its position as it progresses to the destination. INS accuracy degrades with time, but can be aligned in flight using radio navigation system updates. Many inertial systems employ a sophisticated automatic update scheme using dual- Distance Measuring Equipment (DME), very high frequency (VHF) Omnidirectional Range VOR or other sensor inputs (e.g., Global Positioning System (GPS)).

INS may be approved as a primary navigation system or may be used in combination with other systems. By programming a series of waypoints, the system will navigate along a predetermined track. INS provides an Area Navigation (RNAV) capability that permits operation on any desired course.

Integrated Information Workstation - Build 1

IIW Build 1 will include the infrastructure and system interfaces to acquire, analyze, store, update, display, and manage the following information in an integrated manner: (1) National Airspace System (NAS) aeronautical, (2) airport environmental, (3) airborne and surface surveillance, (4) flight information, (5) weather information, and (6) NAS status. Build 1 will also replace its predecessor system, FAA Data Display System, as well as interface with the following systems in support of its mission: Flight Object Management, System Wide Information Management, Next Generation- Traffic Flow Management, Maintenance Management System, Unified Decision Management System, and Aeronautical Information Management.

Integrated Information Workstation - Build 2

Build 2 will incorporate new hardware technology and software enhancements through a technical refresh program.

Leased Inter-facility National Airspace System Communication System

The Leased Inter-facility National Airspace System Communication System (LINCS) provides transmission channels of various industry-standard types between any specified end points, used to satisfy all FAA operational and some administrative telecommunication requirements.

Loran-C

Loran-C is a low frequency (LF), long-range, ground-based radionavigation aid operated by the U.S. Coast Guard. Loran-C avionics measure the time difference between signals received from three or more ground stations and determine the two-dimensional position (i.e., latitude and longitude) and velocity of the aircraft. Loran-C avionics provide an Area Navigation (RNAV) capability that permits operation on any desired course within the coverage area of the stations being used.

Loran-C is currently approved as a supplemental system in the National Airspace System (NAS), meaning that it must be used in conjunction with a primary system. Current Loran-C avionics support en route navigation but do not support instrument approach operations.

Operation of Loran-C beyond 2008 will be based upon a determination by the Department of Transportation and the Department of Homeland Security whether the system is needed as a backup to GPS for transportation and timing applications.

Microprocessor-En Route Automated Radar Tracking System (key system)

The Microprocessor-En Route Automated Radar Tracking System (Micro-EARTS) is a radar processing system implemented with Commercial Off-the-Shelf (COTS) equipment, for use in both En Route and Terminal environments. It provides single sensor and a mosaic display of traffic and weather using long- and short-range radars. At Anchorage, Alaska, Micro-EARTS also provides Automatic Dependent Surveillance-Broadcast (ADS-B) surveillance and display. Micro-EARTS interfaces with multiple types of displays, including Display System Replacement (DSR), Digital Bright Radar Indicator Tower Equipment (DBRITE), and the flat panel tower controller displays.

Mode Select

The Mode Select (Mode S) mechanism is a ground-based system capable of selective interrogation of Mode S transponders and general interrogation of Air Traffic Control Radar Beacon System (ATCRBS) transponders within range. The system also receives, processes, and forwards the transponder replies to appropriate air traffic control (ATC) automation systems. Data formats for both interrogation and reply include data exchange capability.

The system also provides a Traffic Information Services (TIS) function that makes local traffic data available to the flight deck via the Mode S data link. TIS, a Mode S data link service, provides automatic traffic advisories to properly equipped aircraft. Pilots are able to request and receive a display of nearby traffic. The relative range, bearing, and altitude (if known) and a "proximate" or "threat" classification of nearby aircraft will be displayed in the cockpit.

Multi-Mode Digital Radios

Multi-Mode Digital Radios (MDRs) are ground-based Very High Frequency (VHF) air-traffic-control radios that can operate in several configurations: 1) analog voice with 25kHz channel spacing; 2) analog voice with 8.33 kHz channel spacing; and 3) VHF Data Link (VDL) Mode-3 which consists of two-way digital voice and data communication.

Multi-Sector Oceanic Data Link

Multi-sector Oceanic Data Link System (MSODL) supports air-ground data link communications and extends single sector data link functionality to all Oceanic Display and Planning System (ODAPS) sector positions. Oceanic Data Link (ODL) gives controllers two-way electronic communications with aircraft equipped with data link. The technology is designed to reduce/eliminate the need for voice communication thus improving the reliability and timeliness of message delivery. The ODL provides a means to automatically check pending clearances for conflicts, while enabling flight crews automatically to load flight clearances into the Flight Management System (FMS). The ODL also gives controllers an integrated interface with the flight data processor (FDP). It also addresses problems with the existing high-frequency (HF) communications with aircraft, such as frequency congestion, transcription errors and lack of timeliness.

National Airspace Data Interchange Network Message Switch Network

The National Airspace Data Interchange Network Message Switch Network (NADIN MSN) (sometimes called NADIN 1A) is an integrated store-and-forward telecommunications system consisting of message-switched networks, accessed by remote concentrators. NADIN MSN provides flight plan, weather, and Notice to Airmen (NOTAM) information, and meets the International Civil Aviation Organization (ICAO) requirements for Aeronautical Fixed Telecommunications Network (AFTN) support.

Next Generation Traffic Flow Management

The Next Generation Traffic Flow Management (NG-TFM) system provides an array of automation and data processing tools for Traffic Management Specialists (TMS) and Traffic Management Coordinators (TMC), as well as a gateway that enables NAS users to make changes in flight schedules based on planned traffic initiatives (e.g., Ground Delay Programs) and other NAS data. This enhanced decision support system provides increased information exchange between FAA service providers and NAS users. NG-TFM receives flight schedules from NAS users (e.g., air carriers) and combines these with weather data, NAS status data, and planned traffic initiatives to generate detailed graphical and textual traffic displays as far as 24 hours into the future on both national and local scales. Features include both pre-flight and post-flight analysis tools, flight data archiving, enhanced traffic displays, traffic strategy (one or more initiatives) automation, "what if" strategy analysis, and automated TFM training tools.

NG-TFM is comprised of five different software component systems and will include a hardware and operating system software tech refresh. The complete NG-TFM software package includes changes to support interfaces with the Flight Object Management System (FOMS) and System Wide Information Management (SWIM). When complete, this will establish a new NG-TFM system baseline.

Power Systems

The Power Systems (Pwr Sys) mechanism provides for the conditioning of commercial power, including uninterruptible power systems (UPS), to eliminate voltage dropouts, surges, and voltage sags caused by sources outside the facility. Power distribution, grounding, bonding and shielding of electrical system within the facility is also part of the Pwr Sys.

The Power Systems (Pwr Sys) mechanism provides the following: 1.) ACEPS Busway Replacements, 2.) ACEPS EG Maintenance, 3.) ACEPS Monitoring & Diagnostics, 4.) ACEPS Fuel System Upgrade, 5.) ACEPS Training, 6.) Battery Monitoring, 7.) Training Facility, 8.) CPDS, 9.) Battery Replacements, 10.) DC Systems, 11.) EG, 12.) LPGBS, 13.) Power Cable, 14.) UPS, 15.) Contract Support.

Radio Communication Link

Radio Communication Link (RCL) is an integrated voice and data microwave transmission system designed to provide the FAA with cost effective and reliable service for its high capacity NAS communications routes. RCL interconnects air route traffic control center (ARTCC) facilities with long range radar installations and other air traffic control (ATC) facilities.

Radio Control Equipment

Radio Control Equipment (RCE), located at both ATC facilities and remote communication sites, control the operation of remotely located ground to air Very High Frequency/Ultra High Frequency (VHF/UHF) radios used by air traffic controllers to communicate with pilots. RCE interfaces with the voice switch at the ATC facility, telephone landlines, and ground to air radios at the En Route Remote Communications Air/Ground (RCAG) sites, Terminal Remote Transmitter/Receiver (RTR) sites, and Flight Service Station Remote Communications Outlet (RCO) sites.

Satellite Telecommunications Data Link

Oceanic Centers use Satellite Telecommunications Data Link (SATCOM DL) mechanism transfer data between ground stations and aircraft. The FAA contracts for the satellite communications services and uses FANS-1A applications in the Oceanic automation system.

The FAA has no plans to develop its own SATCOM air to ground communications system.

Surveillance Data Network (key system)

National Airspace System (NAS) surveillance systems, including radar and automatic dependent surveillance systems will provide surveillance data objects via the Surveillance Data Network (SDN), which is a sub-network of the System Wide Information Management (SWIM) and the FAA Telecommunication Infrastructure (FTI). The published Surveillance Data Objects (SDO) will be made available to NAS and other users, including the Transportation Security Administration, Department of Defense, and others. Surveillance data availability supports 3-mile separation standards, gate-to-gate traffic management, seamless airspace, and dynamic resectorization. Improved surveillance information is provided in a timely and consistent manner seamlessly across the NAS for operations, planning, and decision making. The information will be available to all users and service providers via SDO in near real time. This information enables decisions to be based on a shared common view of situations, even as conditions are changing. Improved surveillance with SDOs will provide the automation higher quality of data for seamless surveillance and, in combination with other capabilities and new procedures, enable capacity and safety improvements. These benefits accrue from increased situation awareness by decision makers and improved operation of decision support and analysis tools that use surveillance information.

Sustain Air Route Traffic Control Center Facilities

The Sustain Air Route Traffic Control Center Facilities (Sustain ARTCC Facilities) mechanism replaces obsolete equipment and rehabilitates space in Air Route Traffic Control Center (ARTCC) facilities.

System Wide Information Management Build 1A (key system)

SWIM provides for National Airspace System (NAS)-wide transport and sharing of information between the Federal Aviation Administration and users. SWIM is a consistent and single point of entry for users to publish and subscribe to NAS data. SWIM provides context-sensitive information to NAS elements that require the information. SWIM replaces many single-focus networks, such as FIRMNet and CDMnet. This build will integrate Aeronautical, Weather, and NAS Resource Status information systems into the SWIM architecture. A SWIM Management Unit, at each facility, will support the sending (publishing) and receiving (subscribing) of data on SWIM and the SDN. A central SWIM Directory Management Unit will maintain a directory of data available for subscription and publication.

System Wide Information Management Build 1B

Build 1B provides all items in 1A, including more NAS information. This build integrates Flight and Surveillance Information systems into the SWIM architecture.

Ultra High Frequency Airborne Radios

The Ultra High Frequency Avionics (UHF Avionics) are analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225-400 MHz frequency band, which are multi-channel transceivers, installed in an airborne military platform. These airborne devices support the tactical two-way voice communications/ coordination between the military pilot in the military aircraft and the controller on the ground.

Ultra High Frequency Ground Radios

Ultra High Frequency (UHF) Ground Radios are analog UHF amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 Mhz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and flight service station domains.

Unified Decision Management System

The Unified Decision Making System (UDMS) enhances the Collaborative Decision Making (CDM) process by enabling NAS users and the FAA to share flight schedules, planned traffic initiatives (e.g., Ground Delay Programs), advanced traffic flow predictions, and other NAS data electronically. UDMS upgrades the basic CDM functionality of the TFM-M system hub that connects to user-owned data networks. NAS users gain access to more sophisticated graphical and textual traffic flow predictions, as well as automated planning and analysis tools.

Very High Frequency Airborne Radios

Very High Frequency (VHF) Airborne Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 Mhz frequency band which are multi-channel transceivers installed in an airborne platform (e.g., commercial, cargo, and general aviation aircraft). These airborne devices support the tactical two-way voice communications/coordination between the pilot in the aircraft and the controller on the ground.

Very High Frequency Data Link - 2 Avionics

Very High Frequency Data Link - 2 Avionics (VDL-2 Avionics) consist of airborne radios operating in the very high frequency (VHF) range that receive and transmit data using a low-speed, bit-oriented protocol and Carrier Sense Multiple Access (CSMA).

Very High Frequency Ground Radios

Very High Frequency (VHF) Ground Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 MHz frequency band which are single-channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the pilot in commercial, cargo, or general aviation aircraft in the oceanic, en route (i.e., ARTCC), terminal (i.e., TRACON/tower), and flight service station domains. Additionally, there are analog VHF frequency modulation (VHF - FM) radio devices operating in the 161 - 174 MHz frequency band that are multi-channel transceivers. These transceivers are used by flight inspection, aviation security, and airway facility specialists supporting local airport operations and maintenance or to perform their operational maintenance mission in support of the NAS. However, these same VHF-FM transceivers are also used to support the resolution of emergency situations or establish a level of voice command and control communications/coordination during disaster recovery.

Very High Frequency Multi-Mode Airborne Radios

Very High Frequency Multi-Mode Airborne Radios (VHF MM Airborne Radios) refers to an airborne radio operating in the very high frequency (VHF) range capable of operating in the following modes: (1)) analog voice (i.e., 25 kHz spacing for use in the United States and other similarly equipped countries); (2) VHF Digital Link Mode 2 (VDL Mode-2) (two-way digital data transmission); (3) VHF Digital Link Mode 3 (VDL Mode-3), (integrated two-way digital voice/data transmission); and (4) analog voice (i.e., 8.33 kHz spacing for use in Europe and other similarly equipped countries).

Voice Switching and Control System Modification (Control System Upgrade)

The VSCS control system upgrade (VCSU) is a replacement of the Tandem computers that perform the logical switching and control for the VSCS system. The replacement of Tandem computers is for all ARTCCs including three spares.

Voice Switching and Control System Modification (Technological Refresh)

The Tech Refresh for VSCS is a service life extension. The Tech Refresh encompasses workstation upgrade, video display monitor, control equipment power, VSCU supportability, control shelf power supply, and software development demonstration system expansion.

Voice Switching and Control System Training and Backup Switches

Voice Switching and Control System Training and Backup Switch (VTABS) was developed to meet AT requirements for a separate standalone VSCS Backup and Training System. VTABS can be configured as a 50-position switch with the capability to support air traffic operations in the event of VSCS failure, hardware and software maintenance or power loss.

Support Activities

AT Procedure Development for Synchronizing Traffic for Flexible Entry into Oceanic Tracks

Air Traffic Procedures document air traffic services and how they are implemented. The introduction of new systems, or changes to existing systems, may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

AT Training for Synchronizing Traffic for Flexible Entry into Oceanic Tracks

Air Traffic (AT) training is provided to the AT workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AT Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

FAA Certification for Synchronizing Traffic for Flexible Entry into Oceanic Tracks

FAA certification is an activity necessary to support people and systems in the delivery of NAS services. Avionics and associated systems are deemed to be critical to the safety of flight and must be certificated. In addition certain operators and service providers require to be certified such as pilots, dispatchers and others. Certification will generally begin 24 months prior to Initial Operating Capability, and be complete prior to receiving or giving service.

Non-FAA Pilot Procedure Development for Synchronizing Traffic for Flexible Entry into Oceanic Tracks

A number of NAS users document the way their activities are to be carried out. The introduction of new systems, or changes to existing systems may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development will generally begin once ATC procedures have been established and be complete by 90 days prior to Initial Operating Capability, in order to facilitate training.

Non-FAA Pilot Training for Synchronizing Traffic for Flexible Entry into Oceanic Tracks

Non-FAA Pilot Training is provided to educate pilots as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional pilot training. Training will generally begin 60 days prior to IOC and be complete within one year following Full Operating Capability.

Non-FAA Procedure Development for Synchronizing Traffic for Flexible Entry into Oceanic Tracks

A number of NAS users document the way their activities are to be carried out. The introduction of new systems, or changes to existing systems may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development will generally begin once ATC procedures have been established and be complete by 90 days prior to Initial Operating Capability, in order to facilitate training.

Non-FAA Training for Synchronizing Traffic for Flexible Entry into Oceanic Tracks

Non-FAA Training is provided to educate users and their workforces as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional pilot training. Training will generally begin 60 days prior to IOC and be complete within one year following Full Operating Capability.

People

Airline Operations Center Dispatcher

The Airline Operations Center Dispatcher (AOC Dispatcher) is a major airline employee that enters bulk flight plan requests and works with FAA by revising schedules and providing flight cancellations based on FAA provided data (aggregate demand lists, arrival rates, and parameters for anticipated ground delays.)

Non-Radar Controller

A Non-Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate transfer of control, communications, and flight data; Ensure computer entries are completed on instructions or clearances issued or received; Ensure strip marking is completed on instructions or clearances issued or received.

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Planning Controller

A Planning Controller performs the following activities: Ensure separation; Initiate control instructions; Operate interphones; Conduct air/ground communications via data link; Coordinate tactical traffic flows; Scan flight data; Correlate with situation data; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the tactical controller when aware of those instructions.

Radar Associate Controller

A Radar Associate Controller performs the following activities: Ensure separation, initiate control instructions; operate interphones; Accept and initiate non-automated handoffs; and ensure radar controller is made aware of the actions; Assist the radar controller by accepting or initiating automated handoffs/pointouts which are necessary for the continued smooth operation of the sector, and ensure that the radar controller is made immediately aware of any action taken; Coordinate, including pointouts; Monitor radios when not performing higher priority duties; Scan flight progress strips; Correlate with radar data; Manage flight progress strips; Ensure computer entries are completed on instructions issued or received; Enter instructions issued or received by the radar controller when aware of those instructions.

Radar Controller

A Radar Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios; Accept and initiate automated handoffs; Assist the radar associate controller with non-automated handoff actions when needed; Assist the radar associate controller in coordination when needed; Scan radar display; Correlate with flight progress strip information; Ensure computer entries are completed on instructions or clearances you issue or receive; Ensure strip marking is completed on instructions or clearances you issue or receive.

Tactical Controller

A Tactical Controller performs the following activities: Ensure separation; Initiate control instructions; Monitor and operate radios and data link; Oversee data link communications by the associate tactical controller; Accept and initiate automated handoffs; Assist the planning controller with non-automated handoff actions when needed; Assist the planning controller in coordination when needed; Scan the situation display; Correlate with flight data; Ensure computer entries are completed on instructions or clearances you issue or receive.

Interfaces

System Wide Information Management Build 1A ← (Flight Data) → Enhanced-Advanced Technologies and Oceanic Procedures

E-ATOP exchanges flight data via SWIM.

Issues

none identified

Service Group Air Traffic Services

Service TM-Synchronization

Capability Surface

Operational Improvement

Current Surface Traffic Management (104201)

Controllers, airline ramp tower personnel, and pilots provide surface synchronization using procedural and visual means. Controllers issue taxi clearances and instructions to provide optimum and predictable flows of traffic by communicating with pilots and vehicle operators on the airport surface. At peak times, controllers manage flow by using dedicated taxiways for arrivals or departures. They establish sequences to support the most expeditious use of departure runways or flow into ramp areas.

06-Jun-2001 to 30-Jun-2008

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

The fundamental purpose of surface traffic synchronization is to get aircraft from the departure gates to the active runway and vice versa in the minimum amount of time without an incident. Surface synchronization of aircraft arriving or departing an airport while they are operating on the airport surface is the responsibility and function of local and ground controllers in the airport traffic control tower and, in some cases, the function of ramp towers. This includes controlling aircraft exiting the runway after touchdown, granting taxi clearance for arrivals and departures, controlling vehicles operating on or crossing taxiways and runways, holding aircraft for departure or for an available gate, granting takeoff clearances, ensuring runway clearance for runway operations, and providing safe taxiway flow management. At controlled airports, the process begins for departure aircraft with the pilot's request for a clearance to move the aircraft from its gate or parking position on the ramp. At major airports where air carriers control large numbers of gates, agreements are in place between the carrier and Federal Aviation Administration (FAA) for control of parking or ramp areas. In these areas, a ramp coordinator designated by the airline directs the movement of aircraft from the gates and on the ramp to a specific point that is defined by the agreement. (At some other airports, personnel that work for the airport operator perform this ramp coordinator function.) At airports where there is no such agreement, both the pilot and ground service personnel work together to ensure safe movement of the aircraft away from the gate and up to the point where air traffic control assumes movement control.

The process of surface movement begins when the aircraft is pushed back or taxies away from the gate. When the aircraft approaches the common movement area beyond the gate and parking area, the aircraft receives further air traffic control (ATC) taxi instructions. When the taxi clearance is issued, the aircraft taxies onto the movement area where FAA ground controllers direct aircraft through the airport's system of taxiways that lead to the assigned departure runway. There are variations on this scenario. The ground controller directs movement to specific taxiways and runways based on the most efficient flow of traffic. The controller may issue a "taxi-to" instruction; this is a clearance through any runway or taxiway intersections up to a specific point short of the active runway. A "hold short' instruction may be issued, which requires the pilot to stop at an intersection of other point and await further clearance.

Surface Movement Advisor (SMA) provides aircraft arrival information to airlines to augment decision making for surface movement of aircraft, and it is used at a number of major airports. Airline/airport ramp tower personnel and Airline Operations Center (AOC) personnel at participating SMA airports receive a one-way feed of Automated Radar Terminal System III(ARTS) data with current traffic information. Specifically, airline/airport personnel receive updated terminal airspace information that they use to accurately estimate and prepare for actual aircraft touchdown. This information supports gate and ramp operations, helps prevent airport gridlock, and reduces taxi delays. This real-time status information, including aircraft position updates, is conveyed to the aircraft while it is in Terminal Radar Approach Control (TRACON) airspace. Department of Defense and "sensitive" aircraft information are filtered out. Aircraft position updates and estimated touchdown times provide airline/airport personnel with a real time position on an arrival, enabling more efficient scheduling of ground crew and gate-support resources. Increased collaboration between tower controllers and ramp personnel can occur if a gate is not available and ramp personnel need to request that ATC hold an arrival aircraft on the airport movement area.

Additional systems and equipment to facilitate surface traffic management include the Airport Movement Area Safety System (AMASS) and Airport Surface Detection Equipment (ASDE).

Benefits

Current operations are provided in the NAS.

Systems

Airport Movement Area Safety System (key system)

The Airport Movement Area Safety System (AMASS) with Airport Surface Detection Equipment (ASDE) provides controllers with automatically generated visual and aural alerts of potential runway incursions and other potential unsafe conditions. AMASS includes the Terminal Automation Interface Unit (TAIU) that processes arrival data from the airport surveillance radar. AMASS adds an automation enhancement to the ASDE-3 and tracks the movement of aircraft and ground vehicles on the airport surface and presents the data to the tower controllers via the ASDE display.

Airport Surface Detection Equipment - Model 3 (key system)

Airport Surface Detection Equipment - Model 3 (ASDE-3) provides primary radar surveillance of aircraft and airport service vehicles on the surface movement area. ASDE-3 is installed at the busiest U.S. airports. Radar monitoring of airport surface operations (ground movements of aircraft and other supporting vehicles) provides an effective means of directing and moving surface traffic. This is especially important during periods of low visibility such as rain, fog, and night operations.

The ASDE-3 will undergo a SLEP to extend its service life through 2015 (see ASDE-3 SLEP), which will enable it to more effectively support AMASS (see) through this same time period.

Airport Surface Detection Equipment - Model 3 Workstation (key system)

Airport Surface Detection Equipment - Model 3 Workstation (ASDE-3 Workstation) displays ASDE-3 primary surveillance of aircraft and vehicles on the airport surface. The workstation is part of the ASDE-3 system; therefore, locations and schedules are identical to ASDE-3.

Automatic Direction Finder

Automatic Direction Finder (ADF) - An aircraft radio navigation system which senses and indicates the direction to a L/MF nondirectional radio beacon (NDB) ground transmitter. Direction is indicated to the pilot as a magnetic bearing or as a relative bearing to the longitudinal axis of the aircraft depending on the type of indicator installed in the aircraft. In certain applications, such as military, ADF operations may be based on airborne and ground transmitters in the VHF/UHF frequency spectrum.

Backup Emergency Communications

Back Up Emergency Communications (BUEC) provides a secondary A/G communications path for the en route environment, giving each controller access to another completely diverse radio channel. The original system, previously employed at all 20 CONUS ARTCCs, uses a limited number of tunable transceivers that are shared by a greater number of controllers through a priority system at the ARTCC.

The old BUEC is being replaced with dedicated BUEC channels on a one per sector basis to solve a serious supportability problem with the 30+-year-old system and to provide each controller with improved back up radio coverage. The new BUEC outlets have been sited for best coverage for the sectors"" service volumes that because of size require multiple RCAGs for coverage will have multiple BUEC sites. The program has no prime contractor. All activities including site selection, engineering, site preparation, transition, and testing are performed by the ANI and regional personnel. The Product Team provides equipment and funding for implementation. The new BUEC system employs the same equipment as the RCAGs.

Backup Emergency Communications Replacement

The Backup Emergency Communications (BUEC) Replacement (BUEC Repl) mechanism replaces existing analog BUEC system with an updated analoq BUEC system. Also provides backup for Remote Communications Air-Ground Facility (RCAG) very high frequency (VHF) and ultra high frequency (UHF) communications channels (radio equipment) that are available to an Air Route Traffic Control Center (ARTCC) for immediate use if one or more primary RCAG frequencies fail. The system consists of remotely controlled equipment, and several VHF and UHF transceivers. A typical BUEC system may provide as many as 60 VHF and UHF transceivers for an ARTCC.

Digital Bright Radar Indicator Tower Equipment (key system)

The Digital Bright Radar Indicator Tower Equipment (DBRITE) is a tower display system that provides a raster scan presentation of radar/beacon videos and automation system alphanumeric data. The system accepts radar, beacon, external map, analog data, and automation system data.

Digital Voice Recorder System

Provides modern digital voice recording devices used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

In Feburary 2004, the DVRS was upgraded with a 24-channel card, which replaced the 16-channel card. This minor upgrade, called DVR II, was not extended to the systems installed prior to February 2004.

Distance Measuring Equipment Avionics

Distance Measuring Equipment Avionics (DME Avionics) receives, processes and displays for the pilot the distance data provided by ground-based DMEs.

Enhanced Terminal Voice Switch (key system)

The Enhanced Terminal Voice Switches (ETVS) are installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) facilities with more than four air traffic controller positions. The ETVS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The ETVS (installed in the ATCT) provides the ATC operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the ETVS.

The ETVS (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within a TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the ETVS.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate ETVS systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Flight Data Input/Output (key system)

The Flight Data Input/Output (FDIO) system provides flight progress information for use by the Tower, Terminal Radar Approach Control (TRACON) and Air Route Traffic Control Center (ARTCC) controllers. The FDIO system allows Air Traffic Control (ATC) Specialists to input automated flight data, perform data manipulation, and print flight strips.

High Frequency Ground Radios

High Frequency (HF) Ground Radios are analog HF radio devices operating in the 2 - 30 Mhz frequency band, which may be single channel transmitters and receivers or multi-channel transceivers. These radio devices are installed at oceanic and en route facilities and used to support tactical air traffic control (ATC) voice communications between a ground controller and a pilot in an aircraft in the oceanic domain. Additionally, these devices are also installed at regional facilities and used to support voice command and control communications /coordination in emergency or during disaster recovery situations occurring in the NAS.

Integrated Communications Switching System Type I (key system)

The Integrated Communications Switching System Type I (ICSS I) are installed at Airport Traffic Control Towers (ATCT), Terminal Radar Approach Control (TRACON) facilities, and Automated Flight Service Stations (AFSS).

The ICSS I (installed in the ATCT) provides the air traffic control (ATC) operational ground-ground voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/air traffic control system command center (ATCSCC) specialists. Ground-air radio connectivity between ATCT controllers and pilots is also supported by the ICSS I.

The ICSS I (installed in the TRACON) provides the ATC operational ground-ground voice communications interconnectivity between controllers within TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Ground-air radio connectivity between TRACON controllers and pilots is also supported by the ICSS I.

The ICSS I (installed in the AFSS) provides the ATC operational ground-ground voice communications interconnectivity between specialists within an AFSS (intercom), interconnectivity between specialists in separate AFSSs (interphone), and interconnectivity between Flight Service Station (FSS) specialists and Air Route Traffic Control Center (ARTCC) controllers/TRACON controllers/ATCT controllers/Air Traffic Control System Command Center (ATCSCC) specialists. Ground-air radio connectivity between AFSS specialists and pilots is also supported by the ICSS I.

Integrated Communications Switching System Type II (key system)

The Integrated Communications Switching System Type II (ICSS II) are installed at Airport Traffic Control Towers (ATCT), Automated Flight Service Stations(AFSS), and Terminal Radar Approach Control (TRACON) facilities.

The ICSS II (installed in the ATCT) provides the air traffic control (ATC) operational ground-ground voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Ground-air radio connectivity between ATCT controllers and pilots is also supported by the ICSS II.

The ICSS II (installed in the TRACON) provides the ATC operational ground-ground voice communications interconnectivity between controllers within TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC)) controllers/ Flight Service Station (FSS) specialists/air traffic control system command center (ATCSCC) specialists. Ground-air radio connectivity between TRACON controllers and pilots is also supported by the ICSS II.

Multi-Mode Digital Radios

Multi-Mode Digital Radios (MDRs) are ground-based Very High Frequency (VHF) air-traffic-control radios that can operate in several configurations: 1) analog voice with 25kHz channel spacing; 2) analog voice with 8.33 kHz channel spacing; and

3) VHF Data Link (VDL) Mode-3 which consists of two-way digital voice and data communication.

Power Systems

The Power Systems (Pwr Sys) mechanism provides for the conditioning of commercial power, including uninterruptible power systems (UPS), to eliminate voltage dropouts, surges, and voltage sags caused by sources outside the facility. Power distribution, grounding, bonding and shielding of electrical system within the facility is also part of the Pwr Sys.

The Power Systems (Pwr Sys) mechanism provides the following: 1.) ACEPS Busway Replacements, 2.) ACEPS EG Maintenance, 3.) ACEPS Monitoring & Diagnostics, 4.) ACEPS Fuel System Upgrade, 5.) ACEPS Training, 6.) Battery Monitoring, 7.) Training Facility, 8.) CPDS, 9.) Battery Replacements, 10.) DC Systems, 11.) EG, 12.) LPGBS, 13.) Power Cable, 14.) UPS, 15.) Contract Support.

Radio Control Equipment

Radio Control Equipment (RCE), located at both ATC facilities and remote communication sites, control the operation of remotely located ground to air Very High Frequency/Ultra High Frequency (VHF/UHF) radios used by air traffic controllers to communicate with pilots. RCE interfaces with the voice switch at the ATC facility, telephone landlines, and ground to air radios at the En Route Remote Communications Air/Ground (RCAG) sites, Terminal Remote Transmitter/Receiver (RTR) sites, and Flight Service Station Remote Communications Outlet (RCO) sites.

Rapid Deployment Voice Switch Type I (key system)

The Rapid Deployment Voice Switch Type I (RDVS I) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS I (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the RDVS I. The RDVS I (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the RDVS I.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS I systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Rapid Deployment Voice Switch Type IIA

The Rapid Deployment Voice Switch Type IIA (RDVS IIA) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS IIA (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. The RDVS IIA also supports air-to-ground (A/G) radio connectivity between ATCT controllers and pilots. The RDVS IIA (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between TRACON controllers and pilots is also supported by the RDVS IIA.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS IIA systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Small Tower Voice Switch (key system)

The Small Tower Voice Switch (STVS) is installed in small Airport Traffic Control Towers (ATCT) and in Flight Service Stations (FSS). The basic STVS has four operator positions. The STVS provides the Air Traffic Control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and Air Route Traffic Control Center (ARTCC) controllers/ Terminal Radar Approach Control (TRACON) controllers/FSS specialists/air traffic control system command center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the STVS. The STVS (installed in the FSS) provides the ATC operational G/G voice communications interconnectivity between specialists within an FSS (intercom), interconnectivity between specialists in separate FSSs (interphone), and interconnectivity between FSS specialists and Air Route Traffic Control Center (ARTCC) controllers/Terminal Radar Approach Control (TRACON) controllers/ATCT controllers/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground radio connectivity between FSS specialists and pilots is also supported by the STVS.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate STVS systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Surface Movement Advisor (Free Flight Phase 1) (key system)

The Surface Movement Advisor (Free Flight Phase 1) (SMA FFP1) is located at TRACONs and towers, has displays located at AOCs, and SMA and AOCs share information using ETMS and the ETMS Hub Site. SMA obtains aircraft arrival information, including aircraft identification and position, from TRACON automation and provides SMA information to airline ramps at towers and AOCs. Continual updates of touchdown times generated by SMA help airlines manage ground resources at the terminal more efficiently.

The SMA system is based on a client-server architecture running in a UNIX environment. A fiber backbone between the airlines, the airport management, the (Airline) ramp towers and the FAA Control Tower links the SMA together. The system collects and manages various traffic data inputs from sources such as Automated Radar Terminal System (ARTS) (i.e., ARTS-IIIA and IIIE), Standard Terminal Automation Replacement System (STARS), TRACON RADAR, Official Airline Guide (OAG), and Aircraft Communications and Reporting System (ACARS) in real time by the SMA server and auxiliary network computer clients.

AOCs provide SMA with information such as flight readiness status within minutes of departure. SMA generates messages when a flight: (a) transitions from a Center to a TRACON, (b) is on final approach, and (c) has touchdown. SMA calculates estimated taxi time to the gate, time of arrival at the gate, and taxi time to take-off; and SMA uses historical data to project true demand on airport departure capacity. In 2003, SMA began transitioning from ARTS to STARS for receipt of flight arrival and departure information.

Systems Atlanta Information Display System (key system)

A Systems Atlanta Information Display System (SAIDS) enables users to collect and/or input, organize, format, update, disseminate, and display both static and real-time data regarding weather and other rapidly changing critical information to air traffic controllers and Air Traffic Control (ATC) supervisors/Managers. SAIDS is installed at Airport Traffic Control Towers (ATCT), Terminal Radar Approach Control (TRACON) facilities, Air Route Traffic Control Centers (ARTCC), regional offices, and Flight Service Station (FSS) facilities.

Ultra High Frequency Airborne Radios (key system)

The Ultra High Frequency Avionics (UHF Avionics) are analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225-400 MHz frequency band, which are multi-channel transceivers, installed in an airborne military platform. These airborne devices support the tactical two-way voice communications/ coordination between the military pilot in the military aircraft and the controller on the ground.

Ultra High Frequency Ground Radios (key system)

Ultra High Frequency (UHF) Ground Radios are analog UHF amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 Mhz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and flight service station domains.

Ultra High Frequency Ground Radios - Replacement

The Ultra High Frequency Ground Radios - Replacement (UHF Ground Radios - Repl) mechanism represents analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 MHz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and Flight Service Station domains.

Very High Frequency Airborne Radios (key system)

Very High Frequency (VHF) Airborne Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 Mhz frequency band which are multi-channel transceivers installed in an airborne platform (e.g., commercial, cargo, and general aviation aircraft). These airborne devices support the tactical two-way voice communications/coordination between the pilot in the aircraft and the controller on the ground.

Very High Frequency Ground Radios (key system)

Very High Frequency (VHF) Ground Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 MHz frequency band which are single-channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the pilot in commercial, cargo, or general aviation aircraft in the oceanic, en route (i.e., ARTCC), terminal (i.e., TRACON/tower), and flight service station domains. Additionally, there are analog VHF frequency modulation (VHF - FM) radio devices operating in the 161 - 174 MHz frequency band that are multi-channel transceivers. These transceivers are used by flight inspection, aviation security, and airway facility specialists supporting local airport operations and maintenance or to perform their operational maintenance mission in support of the NAS. However, these same VHF-FM transceivers are also used to support the resolution of emergency situations or establish a level of voice command and control communications/coordination during disaster recovery.

Very High Frequency Mobile Radios (key system)

Very High Frequency (VHF) Mobile Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 Mhz frequency band which are multi-channel transceivers installed in surface vehicles (e.g., "follow-me," maintenance, administrative, and snow-removal vehicles). These devices support the tactical two-way voice communications/coordination between the operators in the vehicles and the tower controllers or airline operations personnel.

Very High Frequency Omnidirectional Range Avionics

Very High Frequency Omnidirectional Range Avionics (VOR Avionics) receive, process, and display for the pilot the azimuth (bearing) to or from ground-based VOR transmitters.

Increasing numbers of aircraft are being equipped with GPS or WAAS avionics. However, since a reduced network of VOR stations is planned to continue in operation indefinitely as a backup to GPS, VOR avionics are expected to remain in service indefinitely in some aircraft.

Voice Switching and Control System

The Voice Switching and Control System (VSCS) is installed in the Air Route Traffic Control Center (ARTCC). The VSCS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The VSCS provides the Air Traffic Control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ARTCC (intercom), interconnectivity between controllers in separate ARTCCs (interphone), and interconnectivity between ARTCC controllers and Terminal Radar Approach Control (TRACON) controllers/Airport Traffic Control Tower (ATCT) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ARTCC controllers and pilots is also supported by the VSCS.

People

Airline Operations Center Dispatcher

The Airline Operations Center Dispatcher (AOC Dispatcher) is a major airline employee that enters bulk flight plan requests and works with FAA by revising schedules and providing flight cancellations based on FAA provided data (aggregate demand lists, arrival rates, and parameters for anticipated ground delays.)

Clearance Delivery

A Clearance Delivery Controller performs the following activities: Operate communications equipment; process and forward flight plan information; issue clearances and ensure accuracy of pilot read back; assist tower cab in meeting situation objectives; operate tower equipment; utilize alphanumerics.

Ground Controller

A Ground Controller performs the following activities: Ensure separation; Control vehicles as well as aircraft on movement areas other than active runways Initiate control instructions; Monitor and operate communications equipment; Utilize tower radar display(s); Utilize alphanumerics; Assist the tower associate controller with coordination; Scan tower cab environment; Ensure computer entries and strip marking are completed for instructions or clearances issued or received; Process and forward flight plan information; Perform any functions of the tower team which will assist in meeting situation objectives; Coordinate with local control for safe and efficient use of runways and movement areas.

Local Controller

A Local Controller performs the following activities: Ensure separation; Control active runways; Initiate control instructions; Monitor and operate communications equipment; Utilize tower radar display(s); Utilize alphanumerics; Assist the tower associate controller with coordination; Scan tower cab environment; Ensure computer entries and strip marking are completed for instructions or clearances issued or received; Process and forward flight plan information; Perform any functions of the tower team which will assist in meeting situation objectives; Coordinate with ground control for safe and efficient use of runways and movement areas.

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Ramp Controller

The Ramp Controller designated by the airline directs the movement of aircraft from the gates and on the ramp to a specific point that is defined by the agreement between the carrier and FAA.

Surface Vehicle Operator

Ground personnel operate vehicles on the airport surface to support aircraft service, maintenance and other operations. Ground, local, or ramp controllers may provide separation from other ground traffic (aircraft or vehicles) at controller airports. Pilots and ground personnel work together to ensure safe movement of aircraft at all airports.

Traffic Management Coordinators

Traffic Management Coordinators track and predict traffic flows, analyze ground delays, evaluate alternative routing strategies, and plan local traffic patterns at the local facility (ARTCC, TRACON, or Towers)

Traffic Management Specialist

Traffic Management Specialists perform the following activities: Balance air traffic demand with the airspace's capacity to maintain maximum and efficient utilization of the NAS; Coordinate and implement traffic management directives if needed for area of responsibility; Monitor and balance traffic flows within the area of responsibility in accordance with traffic management directives; Evaluate effectiveness of traffic management directives and make necessary adjustments; Document delay information.

Interfaces

Airport Surface Detection Equipment - Model 3 — (Surveillance Data) → Airport Movement Area Safety System

The AMASS tracks the movement of aircraft and ground vehicles detected by the ASDE-3 surface radar and provides visual and aural alerts of potential runway incursions and unsafe conditions.

Enhanced Terminal Voice Switch ← (Voice Communication) → Enhanced Terminal Voice Switch

This interface enables ATC voice communication between controllers in same or different facilities.

Enhanced Terminal Voice Switch ← (Voice Communication) → Integrated Communications Switching System Type I

This interface enables ATC voice communication between controllers in different facilities.

Enhanced Terminal Voice Switch ← (Voice Communication) → Integrated Communications Switching System Type II

This interface enables ATC voice communication between controllers in different facilities.

Enhanced Terminal Voice Switch ← (Voice Communication) → Rapid Deployment Voice Switch Type I

This interface enables ATC voice communication between controllers in different facilities.

Enhanced Terminal Voice Switch ← (Voice Communication) → Small Tower Voice Switch

This interface enables ATC voice communication between controllers in different facilities.

Enhanced Terminal Voice Switch ← (Voice Communication) → Ultra High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Enhanced Terminal Voice Switch ← (Voice Communication) → Very High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Flight Data Input/Output ← (Flight Data) → Flight Data Input/Output

The FDIOs in ARTCCs, TRACONs, ATCTs, and two Oceanic centers (New York and Oakland) exchange flight data with FDIOs in other ARTCCs, FDIOs TRACONs, ATCTs, and two Oceanic Centers (New York and Oakland).

Integrated Communications Switching System Type I ← (Voice Communication) → Integrated Communications Switching System Type I

This interface enables ATC voice communication between controllers in same or different facilities.

Integrated Communications Switching System Type I ← (Voice Communication) → Integrated Communications Switching System Type II

This interface enables ATC voice communication between controllers in different facilities.

Integrated Communications Switching System Type I ← (Voice Communication) → Rapid Deployment Voice Switch Type I

This interface enables ATC voice communication between controllers in different facilities.

Integrated Communications Switching System Type I ⇐ (Voice Communication) ⇒ Small Tower Voice Switch

This interface enables ATC voice communication between controllers in different facilities.

Integrated Communications Switching System Type I ⇐ (Voice Communication) ⇒ Ultra High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Integrated Communications Switching System Type I ⇐ (Voice Communication) ⇒ Very High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Integrated Communications Switching System Type II ⇐ (Voice Communication) ⇒ Integrated Communications Switching System Type II

This interface enables ATC voice communication between controllers in same or different facilities.

Integrated Communications Switching System Type II ⇐ (Voice Communication) ⇒ Rapid Deployment Voice Switch Type I

This interface enables ATC voice communication between controllers in different facilities.

Integrated Communications Switching System Type II ⇐ (Voice Communication) ⇒ Small Tower Voice Switch

This interface enables ATC voice communication between controllers in different facilities.

Integrated Communications Switching System Type II ⇐ (Voice Communication) ⇒ Ultra High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Integrated Communications Switching System Type II ⇐ (Voice Communication) ⇒ Very High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Rapid Deployment Voice Switch Type I ⇐ (Voice Communication) ⇒ Rapid Deployment Voice Switch Type I

This interface enables ATC voice communication between controllers in same or different facilities.

Rapid Deployment Voice Switch Type I ⇐ (Voice Communication) ⇒ Small Tower Voice Switch

This interface enables ATC voice communication between controllers in different facilities.

Rapid Deployment Voice Switch Type I ⇐ (Voice Communication) ⇒ Ultra High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Rapid Deployment Voice Switch Type I ⇐ (Voice Communication) ⇒ Very High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Small Tower Voice Switch ⇐ (Voice Communication) ⇒ Small Tower Voice Switch

This interface enables ATC voice communication between controllers in same or different facilities.

Small Tower Voice Switch ⇐ (Voice Communication) ⇒ Ultra High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Small Tower Voice Switch ⇐ (Voice Communication) ⇒ Very High Frequency Ground Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Ultra High Frequency Ground Radios ⇐ (Voice Communication) ⇒ Ultra High Frequency Airborne Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Very High Frequency Ground Radios ⇐ (Voice Communication) ⇒ Very High Frequency Airborne Radios

This interface enables voice communication between controllers and pilots providing ATC coordination and direction.

Very High Frequency Ground Radios ⇐ (Voice Communication) ⇒ Very High Frequency Mobile Radios

Voice communication providing ATC coordination and direction between controllers and pilots and between controllers and ground vehicle operators.

Issues

none identified

Service Group Air Traffic Services

Service TM-Synchronization

Capability Surface

Operational Improvement

Enhance Surface Traffic Management (104206)

Improved decision support tools integrated into future automation systems use aircraft intent, velocity, and position information, provided by future surveillance and communication systems, for more accurate current position information and traffic synchronization planning. The tools also expand collaboration between controllers, dispatchers, and traffic flow managers, resulting in enhanced management of aircraft and vehicular traffic on the airport surface.

31-Jan-2016 to 30-Dec-2015

Source References

National Airspace System Concept of Operations and Vision for the Future of Aviation (CONOPS)

Operational Improvement Description

Surface traffic management tools, integrated into new automation systems, enhance planning and monitoring of aircraft and surface vehicle movement at selected high-activity airports. The new decision support tools include information on environmental and operational conditions at the airport. Updates are received via the System Wide Information Management (SWIM)system. The new tools inform service providers of all arrival, surface, and departure schedules via SWIM. Surface and airborne surveillance data is provided through the Surveillance Data Node (SDN). Data sharing at the airport allows service providers to coordinate local operations with airline ramp and airport operators, which improves airport operations. The new tools integrate planning functions, providing an expanded conformance monitoring and probe function that data-links an alert directly to the cockpit. All these automation systems support monitoring, routing, and timing of aircraft surface movement and are fully integrated with the flight data, traffic management, and local weather system functions. Surface map displays of surface movement safety and guidance information are available in both the tower and cockpit to enhance coordination.

The Next Generation Air/Ground Communications (NEXCOM) System and the Communications Management System (CMS) handle tower communications. Two systems are used to display a mixture of terminal and surface information. The Integrated Information Workstation (IIW) provides the tower controller with arrival/departure data. The airborne and surface surveillance data is available on the Standard Automation Platform Remote Workstation (SAP RW). Controllers are able to monitor both surface and airborne traffic via these displays, which can be configurable to the particular needs of the control position in the tower. The Flight Object Management System (FOMS) provides flight data received from multiple sources via SWIM. Surface FOMS data is available to the tower controllers on appropriate displays. Airport Surface Detection Equipment Model X (ASDE-X)will also be availabe in the enchanced surface traffic management system.

Terminal Radar Approach Control (TRACON) data is routinely available throughout the National Airspace System (NAS) via SWIM and Surveillance Data Node (SDN). FOMS expands the flight data processor functionality and uses flight objects to disseminate flight status and traffic management information. The enhanced terminal system provides an improved surveillance data processor for aircraft and surface vehicles (these include Broadcast Services Ground Station (BSGS). The new tools provide for more integrated surface and airspace operations, enabling the airport instrument flight rule capacity to more closely approach visual flight rule capacity. The controller, traffic flow managers, airline operation centers, pilots, and other NAS users can access the same information, which enhances collaborative decision-making.

Benefits

Taxi times will decrease with improved traffic flow and increased situational awareness. System efficiency will improve due to the improved planning data stemming from additional insight into moving active traffic back to the departure gate. These enhancements will result in time and fuel savings and more efficient operations.

Systems

Airport Surface Detection Equipment Model X (key system)

The Airport Surface Detection Equipment Model X (ASDE-X) consists of a primary radar subsystem, multilateration subsystem, data fusion subsystem, and a display. ASDE-X will detect, identify and track targets; project target paths, and alert controllers to possible conflicts. Interfaces with other Air Traffic Control (ATC) automation systems will provide arrival aircraft data tag including position, and aircraft identification, and predicted runway information.

Automatic Dependent Surveillance - Broadcast Avionics (key system)

Automatic Dependent Surveillance-Broadcast Avionics (ADS-B Avionics) transmits and receives Global Positioning System (GPS)-derived aircraft 4-dimensional position data, aircraft identification, aircraft velocity, and other selected aircraft data. Augmented GPS data may be required for certain applications. This is intended to be a surveillance system and not an avoidance system. The broadcast of own position is automatic and is intended to provide surveillance information to other users. The aircraft or vehicle originating the broadcast may not have knowledge of which users are receiving its broadcast. The ADS-B avionics are designed to transmit this 4-dimensional position data of own aircraft or vehicle and to also receive same type of information from others that are similarly equipped to receive and process ADS-B surveillance information.

Automatic Direction Finder

Automatic Direction Finder (ADF) - An aircraft radio navigation system which senses and indicates the direction to a L/MF nondirectional radio beacon (NDB) ground transmitter. Direction is indicated to the pilot as a magnetic bearing or as a relative bearing to the longitudinal axis of the aircraft depending on the type of indicator installed in the aircraft. In certain applications, such as military, ADF operations may be based on airborne and ground transmitters in the VHF/UHF frequency spectrum.

BSGS Broadcast Services Ground Station (key system)

The BSGS (Broadcast Services Ground Station) supports Air-Ground broadcast services. This includes the reception of ADS-B from equipped aircraft/vehicles and the transmission of Traffic Information Service-Broadcast (TIS-B) and Flight Information Service-Broadcast (FIS-B) for use by equipped aircraft. Generally, the BSGS will interface via the SDN to provide ADS-B information to ATC automation and receive TIS-B and FIS-B information from TIS-B and FIS-B servers. The BSGS includes antenna(s), one or more dual link (i.e., 1090 MHz Extended Squitter-1090ES and Universal Access Transceiver-UAT) Ground Based Transceiver(s)(GBT), processing functions and communications functions. Several configurations of the BSGS are required to support variations in the geographic service volume and functions to be supported at specific categories of operational sites. BSGSs will be installed at 448 airports and 100 en route locations. Included are those airports equipped with Secondary Surveillance Radar (SSR) and about 140 additional towered airports (currently without SSR). The BSGS will support ADS-B and TIS-B services via both the 1090ES link and by the UAT link. The BSGS will also support FIS-B via the UAT link. BSGSs incorporate a multilink gateway function that provides ADS-B rebroadcasts via the ADS-B alternate link. A BSGS incorporating 2 GBTs are required for airport surface and terminal surveillance coverage at each of 268 smaller airports, a BSGS incorporating 3 GBTs (on average) are required at 120 of the mid-sized airports, and a BSGS incorporating 6 GBTs (on average) are required at the 60 largest airport (those equipped with ASDE-X or ASDE-3 surface surveillance systems).

The following BSGS functions are required to support the various categories of NAS BSGS sites, except as noted below: (1) 1090ES and UAT receive/transmit (i.e., the GBT funnction); (2) multi-link gateway function; (3) process received ADS-B messages and output (via the SDN) ADS-B reports for use by ATC automation; (4) accept TIS-B and FIS-B information from ground TIS-B/FIS-B servers and manage the generation and broadcast of link specific TIS-B messages via the 1090ES and UAT links and FIS-B messages via the UAT link.

The following BSGS configurations are assumed based on the category of the operational site. Except as noted below all BSGS configuration support the above described functions.

En route (100 sites): (1) One multi-sector antenna with each sector connected to the individual 1090ES and UAT receivers. Supports up to 250 nmi. ADS-B reception. En route locations that are intended to provide only low-altitude gap filler coverage do not require the long-range capability. (2) One omni-directional transmit antenna. Transmitter power sized to support the required TIS-B and FIS-B coverage for that specific site.

Terminal/Airport without ASDE-X (415 airports incl. 27 ASDE-3 equipped airports) with each site having: (1) BSGS with at least 2 GBTs with omni-directional antennas sited for both airport surface and terminal airspace coverage; (2) additional GBTs as needed to provide coverage of the primary airport surface movement area.

Terminal/Airport with ASDE-X (26 ASDE-X plus 7 upgraded ASDE-3 airports with an average of 6 GBTs per BSGS): (1) ASDE-X ground stations upgraded to support GBT functionality; (2) At least two of the GBTs provide ADS-B coverage to the edge of the terminal airspace and the TIS-B coverage; (3) ASDE provides the surveillance data source to support TIS-B for surface traffic.

Backup Emergency Communications Replacement

The Backup Emergency Communications (BUEC) Replacement (BUEC Repl) mechanism replaces existing analog BUEC system with an updated analoq BUEC system. Also provides backup for Remote Communications Air-Ground Facility (RCAG) very high frequency (VHF) and ultra high frequency (UHF) communications channels (radio equipment) that are available to an Air Route Traffic Control Center (ARTCC) for immediate use if one or more primary RCAG frequencies fail. The system consists of remotely controlled equipment, and several VHF and UHF transceivers. A typical BUEC system may provide as many as 60 VHF and UHF transceivers for an ARTCC.

Cockpit Display of Traffic Information Avionics

The Cockpit Display of Traffic Information Avionics (CDTI Avionics) is a generic name for a display that provides the flight crew with surveillance information about other proximate aircraft, including their position. It enables pilots to electronically "see and avoid" other aircraft.

Communications Management System (key system)

The CMS Management and Control function performs tasks for overall management and control of all air/ground and ground/ground voice and data communications to support System Wide Information Management (SWIM). CMS will also incorporate a reconfiguration control function to support reconfigurable airspace assignments, data routing, and a digital recording for both voice and data.

The En Route Automation Modernization program has assumed the data recording function via the Standard Automation Platform, and the Digital Voice Recorder System performs the voice recording function. The CMS routing function is a data router that ensures transport of data communications among Air Traffic Control facilities and users of SWIM. Additionally, CMS integrates functionalities inherently provided by the voice switches, the voice recorders, and the ATN Router.

Digital Bright Radar Indicator Tower Equipment

The Digital Bright Radar Indicator Tower Equipment (DBRITE) is a tower display system that provides a raster scan presentation of radar/beacon videos and automation system alphanumeric data. The system accepts radar, beacon, external map, analog data, and automation system data.

Digital Voice Recorder System Replacement

The Digital Voice Recorder System Replacement (DVRS Replacement) is a modern digital system used to record all communications by air traffic controllers in Towers, TRACONs, AFSSs, and ARTCCs. Voice communications between controllers, pilots, and other ground based air traffic facilities are recorded for legal and accident investigation purposes.

Distance Measuring Equipment Avionics

Distance Measuring Equipment Avionics (DME Avionics) receives, processes and displays for the pilot the distance data provided by ground-based DMEs.

Enhanced Terminal Voice Switch

The Enhanced Terminal Voice Switches (ETVS) are installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) facilities with more than four air traffic controller positions. The ETVS is a modular system. The size of the switch is based on the number of controller positions in the facility.

The ETVS (installed in the ATCT) provides the ATC operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the ETVS.

The ETVS (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within a TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the ETVS.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate ETVS systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Flexible Voice Switch (key system)

Voice communications is the primary means of communications among ATC facilities and between an Air Traffic Control Specialist (ATCS) and a pilot. Voice switching provides the ATCS both G/G Interfacility/Intrafacility and A/G voice communications connectivity. The NAS Voice Switch (NVS) program will replace aging voice switches and their analog interfaces with modern digital voice switches consisting of digital interfaces. The Flexible Voice Switch will be the common platform and baseline voice switch for all NAS domains with modularity and scalability to meet communications connectivity requirements. Additionally, this switch will be expandable to accommodate growth capacity requirements and able to support NAS Modernization needs as described in various Operational Improvements.

Flight Object Management System - Terminal (key system)

The FOMS is a component of the Standard Automation Platform (SAP). The FOMS processes flight data received from multiple sources via the System Wide Information Management (SWIM) Management Unit. The FOMS also receives track data from the Surveillance Data Processor (SDP) and associates tracks with flight data, producing the flight object, which is published to SWIM for subscriber use. Flight plan support functionality includes end-to-end profile evaluation in all phases of flight and evaluation against static and dynamic constraints (terrain, obstacles, airspace restrictions, etc.). The FOMS supports flight planning up to 180 days prior to day of flight. A user can access the flight object from initial to closeout in the same manner. The FOMS provides end-to-end flight data management from preflight to post analysis. Ownership of the flight object begins and ends with Traffic Flow Management and transitions during the flight to clearance delivery, ramp, surface, departure, transition to cruise, cruise, transition to arrival, and ramp. Flight data management is based on trajectory, assigned volumes, and "necessary" route structure.

General Weather Processor

The GWP collects, analyzes, tailors, displays, and distributes weather products. The GWP receives weather data from multiple sensors and distributes processed and tailored weather information via System Wide Information Management. The GWP provides a standard set of algorithms and access to data/products that convey current and future status of impacting weather to all National Airspace System services.

Global Positioning System

The Global Positioning System (GPS) is a worldwide, all-weather, satellite-based navigation system developed, maintained & operated by the U.S Department of Defense, and managed by an Interagency executive board. GPS is a (nominal) 24 satellite constellation orbiting at approximately 12,000 miles above the earth in six planes. Each satellite broadcasts a precisely timed L-band signal on the same frequency. User GPS receivers, oboard aircraft, in ground vehicles or hand-held, receive and process the signals from all satellites in view, with a minimum of four satellites necessary to determine the receiver''s three-dimensional position (i.e., latitude, longitude and altitude), velocity (if applicable) and the precise time of day. GPS equipped aircraft can navigate on published jetways or utilize Area Navigation (RNAV) to fly any desired course between two locations.

GPS avionics built to TSO C-129 support en route and terminal area navigation, as well as non-precision instrument approach operations. Approval has been granted for properly certified GPS avionics to be used as a primary means of navigation in oceanic airspace and in certain remote areas. In July 2003 the Wide Area Augmentation System (WAAS)was commissioned to augment the GPS signal to meet primary navigation service requirements for accuracy, coverage, availability, and integrity.

High Frequency Ground Radios

High Frequency (HF) Ground Radios are analog HF radio devices operating in the 2 - 30 Mhz frequency band, which may be single channel transmitters and receivers or multi-channel transceivers. These radio devices are installed at oceanic and en route facilities and used to support tactical air traffic control (ATC) voice communications between a ground controller and a pilot in an aircraft in the oceanic domain. Additionally, these devices are also installed at regional facilities and used to support voice command and control communications /coordination in emergency or during disaster recovery situations occurring in the NAS.

Integrated Communications Switching System Type I

The Integrated Communications Switching System Type I (ICSS I) are installed at Airport Traffic Control Towers (ATCT), Terminal Radar Approach Control (TRACON) facilities, and Automated Flight Service Stations (AFSS).

The ICSS I (installed in the ATCT) provides the air traffic control (ATC) operational ground-ground voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/air traffic control system command center (ATCSCC) specialists. Ground-air radio connectivity between ATCT controllers and pilots is also supported by the ICSS I.

The ICSS I (installed in the TRACON) provides the ATC operational ground-ground voice communications interconnectivity between controllers within TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Ground-air radio connectivity between TRACON controllers and pilots is also supported by the ICSS I.

The ICSS I (installed in the AFSS) provides the ATC operational ground-ground voice communications interconnectivity between specialists within an AFSS (intercom), interconnectivity between specialists in separate AFSSs (interphone), and interconnectivity between Flight Service Station (FSS) specialists and Air Route Traffic Control Center (ARTCC) controllers/TRACON controllers/ATCT controllers/Air Traffic Control System Command Center (ATCSCC) specialists. Ground-air radio connectivity between AFSS specialists and pilots is also supported by the ICSS I.

Integrated Information Workstation - Build 1 (key system)

IIW Build 1 will include the infrastructure and system interfaces to acquire, analyze, store, update, display, and manage the following information in an integrated manner: (1) National Airspace System (NAS) aeronautical, (2) airport environmental, (3) airborne and surface surveillance, (4) flight information, (5) weather information, and (6) NAS status. Build 1 will also replace its predecessor system, FAA Data Display System, as well as interface with the following systems in support of its mission: Flight Object Management, System Wide Information Management, Next Generation- Traffic Flow Management, Maintenance Management System, Unified Decision Management System, and Aeronautical Information Management.

Multi-Mode Digital Radios

Multi-Mode Digital Radios (MDRs) are ground-based Very High Frequency (VHF) air-traffic-control radios that can operate in several configurations: 1) analog voice with 25kHz channel spacing; 2) analog voice with 8.33 kHz channel spacing; and 3) VHF Data Link (VDL) Mode-3 which consists of two-way digital voice and data communication.

Power Systems

The Power Systems (Pwr Sys) mechanism provides for the conditioning of commercial power, including uninterruptible power systems (UPS), to eliminate voltage dropouts, surges, and voltage sags caused by sources outside the facility. Power distribution, grounding, bonding and shielding of electrical system within the facility is also part of the Pwr Sys.

The Power Systems (Pwr Sys) mechanism provides the following: 1.) ACEPS Busway Replacements, 2.) ACEPS EG Maintenance, 3.) ACEPS Monitoring & Diagnostics, 4.) ACEPS Fuel System Upgrade, 5.) ACEPS Training, 6.) Battery Monitoring, 7.) Training Facility, 8.) CPDS, 9.) Battery Replacements, 10.) DC Systems, 11.) EG, 12.) LPGBS, 13.) Power Cable, 14.) UPS, 15.) Contract Support.

Rapid Deployment Voice Switch Type I

The Rapid Deployment Voice Switch Type I (RDVS I) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS I (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between ATCT controllers and pilots is also supported by the RDVS I.

The RDVS I (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. A/G radio connectivity between TRACON controllers and pilots is also supported by the RDVS I.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS I systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Rapid Deployment Voice Switch Type IIA

The Rapid Deployment Voice Switch Type IIA (RDVS IIA) is installed at Airport Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) and large TRACON facilities with more than four air traffic controller positions. The RDVS is a modular system. The size of the switch is based on the number of controller positions in the facility. The RDVS IIA (installed in the ATCT) provides the air traffic control (ATC) operational ground-to-ground (G/G) voice communications interconnectivity between controllers within an ATCT (intercom), interconnectivity between controllers in separate ATCTs (interphone), and interconnectivity between ATCT controllers and TRACON controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. The RDVS IIA also supports air-to-ground (A/G) radio connectivity between ATCT controllers and pilots. The RDVS IIA (installed in the TRACON) provides the ATC operational G/G voice communications interconnectivity between controllers within an TRACON (intercom), interconnectivity between controllers in separate TRACONs (interphone), and interconnectivity between TRACON controllers and ATCT controllers/Air Route Traffic Control Center (ARTCC) controllers/ Flight Service Station (FSS) specialists/Air Traffic Control System Command Center (ATCSCC) specialists. Air-to-ground (A/G) radio connectivity between TRACON controllers and pilots is also supported by the RDVS IIA.

AND anticipates acquiring a transition voice switch (Interim Voice Switch Replacement (IVSR) mechanism to migrate RDVS IIA systems to the target NAS Voice Communication Switching and Control Service (NAS V-Com). The IVRS contract award is planned for 09/01/04.

Standard Automation Platform Convergence Phase 1 (key system)

The purpose of Standard Automation Platform Convergence Phase 1 (SAP Conv P1) is to reduce both procurement and recurring costs by standardizing and sharing as many hardware and software ATC Automation components as possible.

An engineering convergence task will begin in fiscal year 2005 and run through 2015. All components from each of the automation systems (STARS, ERAM, TFM, etc.) will be analyzed, and the "best of breed" and "core" components will be selected. SAP convergence will be performed in the following areas: (1) Hardware; (2) System Software (operating systems, Commercial-Off-The-Shelf tools, etc.); (3) ATC applications that can be shared across domains; (4) ATC applications that are unique to a domain; and (5) ATC system support tools that can be shared across domains (adaptation, data extraction or systems analysis recording, data reduction and analysis tools, etc.). Proven STARS and ERAM components will be slected, integrated into the SAP, and rigorously tested for replacing STARS and ERAM components at or near their end of service life.

Prototyping begun under Phase 1 will continue with SAP Conv P2. The results of both efforts will lead to refining the requirements to develop the SAP WS mechanism with SDP and FOMS applications.

Standard Automation Platform Remote Workstation Phase 1 (key system)

The SAP RW provides the controller in the tower and the specialist in Flight Advisory Services an interface to the Flight Object Management System and Surveillance Data Processor. The workstation additionally provides the tower controller a display of arrival/departure surveillance data.

Surface Traffic Information Processor (key system)

The STIP would be an extension of the Automatic Dependent Surveillance-Broadcast (ADS-B)/Traffic Information Service - Broadcast (TIS-B) capability at 60 large airports equipped with Airport Surface Detection Equipment (ASDE) Model X or Model 3 systems. A processor would be added at each of these airports to support Traffic Information Service-Broadcast (TIS-B) services for surface and nearby low-altitude traffic. The STIP will receive surveillance information from the ASDE-X or ASDE-3 system and generate TIS-B messages for delivery by the Broadcast Services Ground Stations (BSGSs) providing surface coverage at that airport. The STIP will support of subset of the functionality of the TIS-FIS Broadcast Server (that is intended to support TIS-B for airborne users), but the STIP will support a more real-time TIS-B service with a higher update rates and lower latency consistent with the available surface surveillance data source and the needs to support surface movement operations.

Surveillance Data Network (key system)

National Airspace System (NAS) surveillance systems, including radar and automatic dependent surveillance systems will provide surveillance data objects via the Surveillance Data Network (SDN), which is a sub-network of the System Wide Information Management (SWIM) and the FAA Telecommunication Infrastructure (FTI). The published Surveillance Data Objects (SDO) will be made available to NAS and other users, including the Transportation Security Administration, Department of Defense, and others. Surveillance data availability supports 3-mile separation standards, gate-to-gate traffic management, seamless airspace, and dynamic resectorization. Improved surveillance information is provided in a timely and consistent manner seamlessly across the NAS for operations, planning, and decision making. The information will be available to all users and service providers via SDO in near real time. This information enables decisions to be based on a shared common view of situations, even as conditions are changing. Improved surveillance with SDOs will provide the automation higher quality of data for seamless surveillance and, in combination with other capabilities and new procedures, enable capacity and safety improvements. These benefits accrue from increased situation awareness by decision makers and improved operation of decision support and analysis tools that use surveillance information.

Surveillance Data Processor (key system)

SDP is a component of SAP and operates in En Route and Terminal. The SDP will make improvements to sensors and automation systems that will allow for expanded use of 3-mile separation and terminal procedures. The operational improvements enable more efficient control of aircraft and use of airspace. To accomplish this, all 1030/1090 Beacon interrogators will be upgraded to disseminate their existing 1.2 milli-radian azimuth accuracy and other information, such as time of measurement, confidence, quality, and so on. The automation system algorithms will be improved or new algorithms will be developed to exploit the additional information content of the improved surveillance reports. The method of presentation (display) to support 3-mile separation will be developed and tested to ensure safety. The existing long-range sensor surveillance update period is (12 seconds) and is insufficient to support 3-mile separation. In areas where only long-range sensors exist and where the Air Traffic Service requires 3-mile separation, these sensors may be modified to double the update rate to achieve 3-mile separation.

System Wide Information Management Build 2 (key system)

SWIM Build 2 provides all items in both 1A and 1B, including air-ground network integration. Build 2 includes integration of SWIM with the Aeronautical Telecommunications Network, Next Generation Air/Ground Communications, Satellite Communications, Ground Based Transceivers, Traffic Information Service-Broadcast, and Flight Information Service-Broadcast.

TIS-FIS Broadcast Server (key system)

TIS-FIS Broadcast Servers are located at 22 Air Route Traffic Control Centers and 8 consolidated Terminal Radar Approach Controls/Integrated Control Complex (ICC). TIS-Broadcast (TIS-B) is needed unless full Automatic Dependent Surveillance-Broadcast equipage is achieved. Servers will receive surveillance data (i.e., based on Secondary Surveillance Radar, etc.), from the Surveillance Data Processor (SDP), in the form of Surveillance Data Objects for each target aircraft and will create TIS-B reports. Servers will receive FIS data from weather processors. The TIS and FIS data will be geographically filtered for the defined service volume of each Broadcast Services Ground Station (BSGS), and TIS data will also be filtered for only non-ADS-B-equipped targets.

Ultra High Frequency Airborne Radios

The Ultra High Frequency Avionics (UHF Avionics) are analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225-400 MHz frequency band, which are multi-channel transceivers, installed in an airborne military platform. These airborne devices support the tactical two-way voice communications/ coordination between the military pilot in the military aircraft and the controller on the ground.

Ultra High Frequency Ground Radios (key system)

Ultra High Frequency (UHF) Ground Radios are analog UHF amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 Mhz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and flight service station domains.

Ultra High Frequency Ground Radios - Replacement

The Ultra High Frequency Ground Radios - Replacement (UHF Ground Radios - Repl) mechanism represents analog, ultra high frequency, amplitude modulation (UHF - AM) radio devices operating in the 225 - 400 MHz frequency band which are single channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the military pilot in military aircraft in the oceanic, en route, terminal, and Flight Service Station domains.

Very High Frequency Airborne Radios (key system)

Very High Frequency (VHF) Airborne Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 Mhz frequency band which are multi-channel transceivers installed in an airborne platform (e.g., commercial, cargo, and general aviation aircraft). These airborne devices support the tactical two-way voice communications/coordination between the pilot in the aircraft and the controller on the ground.

Very High Frequency Ground Radios (key system)

Very High Frequency (VHF) Ground Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 MHz frequency band which are single-channel transmitters and receivers operating in a main/standby configuration. These ground-based devices support tactical air traffic control (ATC) via voice communications and coordination between the ground-based controller and the pilot in commercial, cargo, or general aviation aircraft in the oceanic, en route (i.e., ARTCC), terminal (i.e., TRACON/tower), and flight service station domains. Additionally, there are analog VHF frequency modulation (VHF - FM) radio devices operating in the 161 - 174 MHz frequency band that are multi-channel transceivers. These transceivers are used by flight inspection, aviation security, and airway facility specialists supporting local airport operations and maintenance or to perform their operational maintenance mission in support of the NAS. However, these same VHF-FM transceivers are also used to support the resolution of emergency situations or establish a level of voice command and control communications/coordination during disaster recovery.

Very High Frequency Mobile Radios (key system)

Very High Frequency (VHF) Mobile Radios are analog VHF amplitude modulation (VHF - AM) radio devices operating in the 118 - 137 Mhz frequency band which are multi-channel transceivers installed in surface vehicles (e.g., "follow-me," maintenance, administrative, and snow-removal vehicles). These devices support the tactical two-way voice communications/coordination between the operators in the vehicles and the tower controllers or airline operations personnel.

Very High Frequency Omnidirectional Range Avionics

Very High Frequency Omnidirectional Range Avionics (VOR Avionics) receive, process, and display for the pilot the azimuth (bearing) to or from ground-based VOR transmitters.

Increasing numbers of aircraft are being equipped with GPS or WAAS avionics. However, since a reduced network of VOR stations is planned to continue in operation indefinitely as a backup to GPS, VOR avionics are expected to remain in service indefinitely in some aircraft.

Support Activities

AF Training for Enhanced Surface Traffic Management

Airway Facilities (AF) training is provided to AF workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AF Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

AT Procedure Development for Enhanced Surface Traffic Management

Air Traffic Procedures document air traffic services and how they are implemented. The introduction of new systems, or changes to existing systems, may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development lead-time is necessary prior to achieving Initial Operating Capability in order to facilitate training.

AT Training for Enhanced Surface Traffic Management

Air Traffic (AT) training is provided to the AT workforce as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional AT Training. Training generally begins 30 days prior to Initial Operating Capability and is complete within one year of achieving a Full Operating Capability.

Non-FAA Pilot Procedure Development for Enhanced Surface Traffic Management

A number of NAS users document the way their activities are to be carried out. The introduction of new systems, or changes to existing systems may result in the need for new or modified procedures. Procedures may also be revised to include process improvements or other operational changes. Procedure development will generally begin once ATC procedures have been established and be complete by 90 days prior to Initial Operating Capability, in order to facilitate training.

Non-FAA Pilot Training for Enhanced Surface Traffic Management

Non-FAA Pilot Training is provided to educate pilots as new systems and/or procedures are introduced. The introduction of new systems or procedures, or changes to existing systems or procedures may result in the need for additional pilot training. Training will generally begin 60 days prior to IOC and be complete within one year following Full Operating Capability.

People

Airline Operations Center Dispatcher

The Airline Operations Center Dispatcher (AOC Dispatcher) is a major airline employee that enters bulk flight plan requests and works with FAA by revising schedules and providing flight cancellations based on FAA provided data (aggregate demand lists, arrival rates, and parameters for anticipated ground delays.)

Clearance Delivery

A Clearance Delivery Controller performs the following activities: Operate communications equipment; process and forward flight plan information; issue clearances and ensure accuracy of pilot read back; assist tower cab in meeting situation objectives; operate tower equipment; utilize alphanumerics.

Ground Controller

A Ground Controller performs the following activities: Ensure separation; Control vehicles as well as aircraft on movement areas other than active runways Initiate control instructions; Monitor and operate communications equipment; Utilize tower radar display(s); Utilize alphanumerics; Assist the tower associate controller with coordination; Scan tower cab environment; Ensure computer entries and strip marking are completed for instructions or clearances issued or received; Process and forward flight plan information; Perform any functions of the tower team which will assist in meeting situation objectives; Coordinate with local control for safe and efficient use of runways and movement areas.

Local Controller

A Local Controller performs the following activities: Ensure separation; Control active runways; Initiate control instructions; Monitor and operate communications equipment; Utilize tower radar display(s); Utilize alphanumerics; Assist the tower associate controller with coordination; Scan tower cab environment; Ensure computer entries and strip marking are completed for instructions or clearances issued or received; Process and forward flight plan information; Perform any functions of the tower team which will assist in meeting situation objectives; Coordinate with ground control for safe and efficient use of runways and movement areas.

Pilots

The pilot is responsible for the operation and safety of an aircraft during flight and taxi. The pilot responds to and requests heading, altitude, and airspeed instructions given by controllers to maintain separation and achieve traffic synchronization. Pilots with the appropriate category and class rating may act as pilot in command of single-engine airplanes, multiengine airplanes, helicopters, gyroplanes, powered-lift aircraft, gliders, airships, and balloons.

Ramp Controller

The Ramp Controller designated by the airline directs the movement of aircraft from the gates and on the ramp to a specific point that is defined by the agreement between the carrier and FAA.

Surface Vehicle Operator

Ground personnel operate vehicles on the airport surface to support aircraft service, maintenance and other operations. Ground, local, or ramp controllers may provide separation from other ground traffic (aircraft or vehicles) at controller airports. Pilots and ground personnel work together to ensure safe movement of aircraft at all airports.

Traffic Management Coordinators

Traffic Management Coordinators track and predict traffic flows, analyze ground delays, evaluate alternative routing strategies, and plan local traffic patterns at the local facility (ARTCC, TRACON, or Towers)

Traffic Management Specialist

Traffic Management Specialists perform the following activities: Balance air traffic demand with the airspace's capacity to maintain maximum and efficient utilization of the NAS; Coordinate and implement traffic management directives if needed for area of responsibility; Monitor and balance traffic flows within the area of responsibility in accordance with traffic management directives; Evaluate effectiveness of traffic management directives and make necessary adjustments; Document delay information.

Issues

None

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